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तदेकोऽवशिष्टः शिवः केवलोऽहम् ।

सोऽहम् ।

YOGA-MĪMĀṄSĀ

VOL. I FEBRUARY, 1925 NO. 2

Editorial Notes

MAY the Maker of all make this journal a success. Blessed is the name of the Lord. May He bless the workers of the Ās'rama with a happy and prosperous career as servants of the world which is only the Lord Himself objectified. May He, that has created us in His infinite wisdom, lead us to the light that is beyond all darkness.

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IT has been nearly four months since we presented to the public the first issue of our journal. During all these days, the Ās'rama has been making a steady progress, and its work is being more and more appreciated by the general public. We have received a number of letters from distinguished persons, not only of India but also of other countries, stating their intellectual appreciation of what is being done by the Ās'rama and sending us a message of encouragement. The services of the Kaivalyadhāma have been more and more in demand ever since its foundation last October. The circle of people seeking Yogic instruction is appreciably widening, the number of patients placing themselves under Yogic treatment is gradually increasing, and the list of subscribers patronizing this journal is steadily growing. Thus there is progress nearly in every direction. Whatever credit this little success deserves goes, all of it, to the Lord and to our merciful Master. None of it comes to us

and none of it we claim. We know our powers; we know our limitations ! And in our consciousness of these, nothing is left to us but to kneel in gratitude before our Maker and our Master ; and in reverence offer our humble salutations to them, for having selected us to be the agents of this achievement. May they, as a token of their mercifulness to us, the humblest of their servants, allow us to continue their work and bless it with greater success.

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DURING the last quarter we spent some six weeks in a lecturing tour. Ahmednager, Sholapur, Dhulia, Akola and Buldana were the district towns we visited. Lectures were also delivered at some Taluk places. Our experience of this tour is highly encouraging. People of all grades and ages largely attended our discourses. Practical demonstrations of Yogic exercises were given after a theoretical discussion, and they invariably created a deep impression upon the mind of the audience. There was a regular rush of people demanding lessons in Yogic culture everywhere, though our short stay at these places made solid work impossible.

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WE beg to offer our hearty thanks to those editors of papers and periodicals that have spared their valuable time in reviewing our journal. Some of these reviews have been quoted in the Miscellaneous Section. It is a matter of great satisfaction to us to see these learned men speaking of our humble work in such an eloquent manner. In fact the praise that these reviewers have bestowed on us, is all beyond our expectations. We only wish that the Lord would enable us to deserve all this kindness at their hands.

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WHILE the majority of our reviewers have rightly understood the character of our researches and the journal that records them, there appear to be some who have missed the point. They are sorry to see that the first number *does not contain even one article on Yoga proper, that is, mental and spiritual culture.* Now we humbly beg to bring to the notice

of these learned men that the journal is dedicated to record only the *scientific* researches in the field of Yoga. Scientific research can advance only step by step. It cannot at once cover the whole Yogic field. It has started with preliminary practices and will *gradually* proceed from grosser to subtler things. So it will take some time before the higher Yogic exercises are discussed in the pages of this journal.

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THE quotation given in Italics in the last note, seems to suggest, however, that the practices discussed in the first issue do not fall under *Yoga proper*. We do not know whether this suggestion has any authoritative research scholarship behind it. So far as our experience and researches go, we are more than convinced that the exercises mentioned in the last issue have a spiritual bearing. We have expounded only the physiological side of these, simply because *laboratory methods* upto now could tackle only that much ; and our journal has no place for free speculation. We hope to publish even the psycho-physiological aspects of these practices, as our research work advances ; but even then we cannot record anything in this journal that has not passed the rigorous test of modern sciences.

The quotation appears to suggest another thing. Yoga proper is (*only*) mental and spiritual. Now this is a proposition we absolutely fail to understand. We have to confess, in all frankness, that we have yet to know a Yogic exercise that is purely mental and spiritual and has no physiological bearing. We have stated in our notes last time that Yoga is *chiefly* mental and spiritual; and we still maintain the same position. Researches in the mental and spiritual aspects of Yoga, are undoubtedly far superior to the researches in its physiological aspect; but this does not prevent the latter from falling under Yoga proper.

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WE would make our position clear once more. Persons that are equipped with an undying *faith* in spiritual culture and its attainment through Yogic practices, require no scientific

interpretations of these for their progress. But those that take their stand upon *reason*, would be satisfied with nothing short of a scientific explanation of Yoga, if they are to be induced to take to it. There are a number of people falling under the first category, that have placed themselves under the guidance of the Āśrama for their spiritual development. They are not required to wait for a scientific interpretation of an exercise. As soon as they are ready for a particular practice, they start with it. But here too, our experience shows that these people feel stronger in their faith, when they are given a scientific explanation of their work and experiences.

Luckily or unluckily, however, this class of people is fast disappearing. An overwhelming majority of us want our reason to be satisfied before we can accept anything. It is to satisfy the need of such people that the journal is started.

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That the journal is supplying a real want is made clear by the patronage it is getting from all parts of India. The subscribers' list is swelling every day. Letters of thanks are being showered upon us. In our tour many people who entertained tender feelings for Yoga, and who were deeply pained to see that it was losing ground, inch by inch, before the onslaught of modern sciences, have expressed the sense of relief they felt, when they listened to our discourses.

A reference to the letter of Mr. Mead of *The Quest Society, London*, given in the last section, will show how Yoga is being exploited in the West. If this exploitation is to be stopped, we Indians must come forth and tell the world what real Yoga is and how it can stand the searching tests of present day sciences. We must critically examine Yoga in all its aspects. If, however, instead of doing this, we were to neglect the physiological side of Yoga, and also to indulge in free speculation and call it a scientific interpretation of the spiritual aspect of it, we shall never be able to stop the mischief that is being done in the West in the name of Yoga.

A few of the critics of our journal look to be under the impression that the practices discussed by us are dangerous, especially if they are undertaken in the absence of personal guidance. Undoubtedly there are some Yogic exercises which cannot be done save under direct expert supervision. When we come to these exercises we shall not fail to sound a note of warning. Regarding the rest, we humbly point out to our reviewers and readers, that there is nothing dangerous about them, provided the candidate is a man of average mental and physical health, and provided he faithfully follows the instructions given in this journal.

THE editors of a number of very valuable papers and periodicals, both from India and abroad, have arranged to exchange their journals with ours. We have to offer our heart-felt thanks to these friends for the spirit of comradeship they have shown by their action.

WE beg to draw the attention of our readers to the letters printed in the last section. The German letter is from Prof. Dr. Rissom of the Heidelberg University, and tells us that the Germans are taking to exercises similar to those available in Yoga, more than ever before. Everybody knows the success the Germans have achieved in physical culture, and this information from a university professor should convince us of the high value of Yoga as a system of physical culture. One of the American letters is from Dr. Caldwell, the founder of the famous Caldwell Health Home, and states the willingness of a distinguished naturopath to try these Yogic methods in his practice. This will show how Yogic therapeutics can be made attractive even in the West. The line quoted from a letter of Dr. Clare, M. D., Carlton, U. S. A., requires no commentary. Our Indian letters too come from high authorities and are appreciative of our work. We have great pleasure in recording our sense of obligation to these people for having sent us a message of encouragement.

As suggested in the last issue, we have opened a new section, called Miscellaneous, in this number. As, however, we did not receive for publication any letters of criticism bearing on the problems discussed in the first number, we have printed, under this section, press notices and personal appreciations of our journal. It is hoped that this literature will help our readers to better understand the spirit of our work.

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Our best thanks are due to the editor of the Bhishagvilāsa for undertaking to give in Marāthī a substance of the articles appearing in the Yoga-Mīmānsā. The magazine is devoted to a study of Āyurveda, and we are sure its readers will very much appreciate this new feature of the periodical. We can assure the public that the substance appearing in the Bhishagvilāsa will be a faithful representation of the original.

We conclude these notes with our sincere thanks to all those lovers of Yoga that have helped us in our work, and have enabled us to do what little we are doing for the spread of Yogic culture.

The Scientific Section

N. B.—Those of our readers that claim no acquaintance with anatomy and physiology will do well to read the Semi-Scientific Section first.

SYSTEM OF TRANSLITERATION

Letters, their sounds, and a description of these sounds:—

अ	A	Pronounce	'A'	like	'u'	in	'but'.
आ	Ā	„	'Ā'	„	'a'	„	'far'.
इ	I	„	'I'	„	'i'	„	'pin'.
ई	Ī	„	'Ī'	„	'ee'	„	'feel'.
उ	U	„	'U'	„	'u'	„	'fulsome'.
ऊ	Ū	„	'Ū'	„	'oo'	„	'wool'.
ऋ	Ṛ	„	'Ṛ'	„	'rö'	„	German.
ॠ	Ṝ	„	'Ṝ'	„	„	„	„ with a strong accent.
ऌ	Ḷ	„	'Ḷ'	„	'lö'	„	German.
ए	E	„	'E'	„	'a'	„	'fate'.
ऐ	Āī	„	'Āī'	„	'ai'	„	'aisle' but not drawled out.
ओ	O	„	'O'	„	'o'	„	'over'.
औ	AU	„	'AU'	„	'ou'	„	'ounce' but not drawled out.
क	KA	„	'K'	„	'k'	„	'kill'.
ख	KHA	„	'KH'	„	'kh'	„	'ink-horn' or like 'ch' in 'Loch' (Scottish).
ग	GA	„	'G'	„	'g'	„	'girl'.
घ	GHA	„	'GH'	„	'gh'	„	'log-house' or 'ghee'.
ङ	N̄A	„	'N̄'	„	'n'	„	'king' or 'link'.
च	CHA	„	'CH'	„	'ch'	„	'church'.
छ	CHHA	„	'CHH'	„	the second 'ch' in 'churchill'.		
ज	JA	„	'J'	„	'j' in 'join'.		
झ	JHA	„	'JH'	„	palatal 'z' as in 'azure'.		
ञ	N'A	„	'N'	„	'n' in 'pinch'.		
ट	Ṭ A	„	'Ṭ'	„	't'	„	'tub'.
ठ	Ṭ HA	„	'Ṭ H'	„	'th'	„	'pot-house.'

SYSTEM OF TRANSLITERATION

Letters, their sounds, and a description of these sounds:—

ड	DA	Pronounce	'D'	like	'd'	in	'dog'.
ढ	DHA	,,	'DH'	,,	'dh'	,,	'mad-house'.
ण	NA	,,	'N'	,,	'n'	,,	'splinter' or 'and'.
त	TA	,,	'T'	,,	dental 't' as in 'thin', or like the French 'T'.		
थ	THA	,,	'TH'	,,	'th'	in	'thunder'.
द	DA	,,	'D'	,,	'th'	,,	'then'.
ध	DHA	,,	'DH'	,,	'th'	,,	'this'.
न	NA	,,	'N'	,,	'n'	,,	'no'.
प	PA	,,	'P'	,,	'p'	,,	'paw'.
फ	PHA	,,	'PH'	,,	'ph'	,,	'top-heavy', or 'gh' in 'laugh'.
ब	BA	,,	'B'	,,	'b'	,,	'balm'.
भ	BHA	,,	'BH'	,,	'bh'	,,	'hob-house'.
म	MA	,,	'M'	,,	'm'	,,	'mat'.
य	YA	,,	'Y'	,,	'y'	,,	'yawn'.
र	RA	,,	'R'	,,	'r'	,,	'rub'.
ल	LA	,,	'L'	,,	'l'	,,	'lo'.
व	VA	,,	'V'	,,	'w'	,,	'wane'.
श	S'A	,,	'S'	,,	'sh'	,,	'ashes'.
ष	SHA	,,	'SH'	,,	a strong lingual with rounded lips.		
स	SA	,,	'S'	,,	's'	in	'sun'.
ह	HA	,,	'H'	,,	'h'	,,	'hum'.
ळ	LA	A dento-lingual pronounced with a little rounding of lips.					

Visarga—Ḥ; Nasalized म् as in संयम—Ṁ;

Nasalized न् as in मीमांसा—Ṅ.

X-RAY EXPERIMENTS ON UDDIYĀNA

(Continued)

EXPERIMENT III

OBJECT OF THE EXPERIMENT :—

The object of the experiment was to study the behaviour of the colon contents during Uddiyana when the meal had reached the rectum. It was also to note the changes caused by Uddiyana in the normal[1] position of the large bowel.

PREPARATION OF THE SUBJECT :—

The subject was a young boy of sixteen. For years he had suffered from malaria and had a number of complaints about his health. Particular Yogic exercises done regularly for six months had, indeed, set him right. But some of the symptoms continued even after another six months. At the time of the experiments the boy looked quite healthy to all outward appearances. But we discovered during these X-Ray experiments that his appendix was still in a pathological condition, though it had undergone distinct improvement. It may be mentioned here, by the bye, that the subject was given special exercises hereafter, and in a short time the appendix was set right.

On the day previous to the experiment the boy took his usual meal at about 12 noon. His evening food consisted of a cup of milk only. After a sound sleep overnight, he had a clear motion in the morning. The subject went without any food on the day of this experiment till 12 noon, when he was given the opaque meal.

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1 Two radiographs representing the normal positions will appear in the next issue. Till then only those points that are noted in the remarks on skiagrams III and IV may be studied.

THE MEAL :—

The meal was prepared after Dr. Morton's method. The basis of the meal consisted of a semi-solid preparation of milk. To a substantial cup of this, three ounces of barium sulphate were added with a small quantity of ordinary milk. The subject consumed nearly the whole of it.

THE EXPERIMENT PROPER :—

The meal was administered at 12 noon. The subject practised one round of Nauli at 12-15 and another at 12-30. Skiagrams showing the position of the intestinal contents just after these rounds, will be published in the next issue. After the second round it was noted that the meal had already reached the rectum. The boy was then asked to practise Uddiyāna. Radiograph III represents a chart of the intestines during this exercise. Here the student was given exactly the same pose as in Experiment II described on p. 20 in the last issue.

NOTE—

Radiographs printed in this issue were all originally of 12″ × 10″. They have been subsequently reduced to 6″ × 5″ size for the convenience of this journal.

REFERENCES TO RADIOGRAPH III

1 The Right Iliac Bone.

2 The Twelfth Ribs.

3 The Twelfth Dorsal.

4_1 The First Lumbar.

4_2, 4_3, 4_4, 4_5 The Successive Lumbar Vertebræ upto the Fifth.

5 The Appendix.

6 The Upper Half of the Ascending Colon.

7 The Hepatic Flexure.

8 The Transverse Colon.

9 The Splenic Flexure.

10 The Descending Colon.

11 The Sacrum.

12 The Small Intestine.

Fig. XXX *Radiograph III*

Position of the Colon and its Contents during Uḍḍiyāna
When the Meal had reached the Rectum.

POINTS OF STUDY :—

1 — (a) The appendix is in a pathological condition.
(b) Therefore it casts a shadow.
(c) Its location shows that it is considerably raised from its normal position.
(d) It can, therefore, be inferred that the cecum is also raised higher still.

2 — (a) There is a break in the shadow just above the appendix.
(b) The blank shows that the cecum is empty.
(c) The cecal contents seem to be drawn up in the ascending colon.

3 — (a) The blank above the appendix is larger than an empty cecum would cause.
(b) It seems, therefore, that the lower part of the ascending colon is also empty.
(c) Taking into consideration the average comparative lengths of the cecum and ascending colon, it seems that the empty part of the latter is probably nearly half of its total length.

4 — (a) The upper half of the ascending colon casts dark shadows.
(b) Because it is full of barium.
(c) The inclination of the upper part of the ascending colon shows that the whole of it is drawn towards the spinal column during Uddiyāna.

5 — (a) The transverse colon also casts very dark shadows.
(b) Because barium from the empty parts of the colon looks to be gathered there.
(c) It is thrown into an arc lying above the twelfth dorsal.

6 — (a) The splenic flexure also casts very dark shadows.
(b) Because it is full of barium.
(c) The transverse and the descending colons do not appear to make any angle at the splenic flexure.

7 — (a) The upper part of the descending colon also casts shadows.

(b) Because this also contains barium.

(c) What part of the descending colon is empty cannot be very accurately inferred, because the faint shadows marked by the figure 12 have rendered any inference doubtful.

(d) See point 1 of the supplement below.

8 — (a) The shadows marked by the figure 12 are cast by the small bowel.

(b) Because though through the action of Nauli the barium meal has reached the rectum, parts of it are still lingering in the small intestine.

9 — The shadows of the sacrum are made darker by the barium in the neighbouring folds of the small intestine.

10 — (a) In the original radiograph the space occupied by the first four lumbar vertebræ is 5·75".

(b) In the case of the subject selected for this experiment, these vertebræ normally occupied 5·5". (A radiograph representing normal condition of the subject at the time of this experiment, will be published in the next issue of this journal).

(c) The difference of nearly 4·5 per cent in the two measurements is due to a stretch given by the upward pull of the back muscles during Uddiyana.

THE SUPPLEMENT :—

1 — The contents of the descending colon and the sigmoid were observed being drawn up on account of the action of Uddiyana.

2 — The barium meal gathered in the transverse colon and the nearest parts of the ascending and descending colons.

X-RAY EXPERIMENTS ON NAULI

EXPERIMENT I

OBJECT OF THE EXPERIMENT :—

The object of the experiment was to study the behaviour of the colon contents during Nauli-Madhyama--the central aspect of Nauli--when a meal had reached the rectum. It was also to note the changes caused by Nauli-Madhyama in the normal position of the large bowel.

PREPARATION OF THE SUBJECT AND THE MEAL :—

As the boy was taken up for this experiment directly after Experiment III on Uddiyāna (p. 86), these points do not require any additional remarks.

THE EXPERIMENT PROPER :—

Radiograph IV was taken during Nauli-Madhyama as the subject was lying in the same position that he had assumed during experiments on Uddiyāna. The usual poses illustrated in Figs. X and XI of the first issue did not serve the radiographic purpose. Hence the change in position. This change, however, has not affected the results.[1]

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1 See foot-note to p. 86.

REFERENCES TO RADIOGRAPH IV

1 The Right Iliac Bone.
2 The Twelfth Ribs.
3 The Twelfth Dorsal.
4_1 The First Lumbar.
4_2, 4_3, 4_4, 4_5 The Successive Lumbar Vertebræ upto the Fifth.
5 The Appendix.
6 The Cecum
7 The Ascending Colon.
8 The Hepatic Flexure.
9 The Transverse Colon.
10 The Splenic Flexure.
11 The Descending Colon.
12 The Sigmoid.
13 The Small Bowel.

Fig. XXXI *Radiograph IV*

Position of the Colon and its Contents during Nauli-Madhyama
When the Meal had reached the Rectum.

POINTS OF STUDY:—

1 — (a) The appendix casts a faint shadow.
(b) It seems to be in a pathological condition.
(c) Its location shows that it is raised from its normal position.

2 — (a) Shadows marked by the figure 6 look to be cast by the cecum.
(b) Because they are broader than those of the appendix.
(c) They are not deep and suggest that the contents are not in a thickly concentrated condition.
(d) The cecum appears to be considerably raised from its normal position.

3 — (a) Average comparative lengths of the ascending colon and the cecum suggest that the shadows marked by 7 are cast by the ascending colon.
(b) These are darker than the shadows of the cecum and show greater concentration of the contents.
(c) The appendix, cecum and ascending colon are drawn towards the spine; and arrange themselves in a curve that makes the nearest approach to the vertebral column at the commencement of the ascending colon.

4 — (a) The hepatic flexure casts deep dark shadows.
(b) Because it contains barium in a highly concentrated form.

5 — (a) Darkest shadows are cast by the transverse colon.
(b) A part of the barium from the ascending and descending colons has been drawn up here, and the concentration of the bowel contents is consequently the greatest.
(c) The transverse colon is thrown into an arch curving round the twelfth dorsal.
(d) It does not make an angle either with the ascending or with the descending colon.

6 — (a) The splenic flexure casts deep dark shadows.
(b) Because it contains barium in a highly concentrated form.

7 — (a) In the descending colon the contents appear to be thinly distributed.

(b) Because they cast only light shadows.

(c) The curve given to the descending colon in Nauli is more pronounced than the curve of the ascending colon. The lower part of it is almost in front of the spine.

8 — (a) The sigmoid looks to be drawn completely before the spine.

(b) *In all probability* its shadows are darker than those of the descending colon.

(c) Being overshadowed by the spine it affords little opportunity for observation.

9 — (a) The shadows marked by the figure 13 are cast by the small bowel.

(b) Because though through the action of Nauli, the barium meal has reached the ractum, parts of it are still lingering in the small intestine.

10 — (a) In the original rediograph the space occupied by the first four lumbar vertebræ is 5·25".

(b) In the case of the subject selected for this experiment, these vertebræ normally occupied 5·5". (A radiograph representing normal condition of the subject at the time of this experiment, will be published in the next issue of this journal.)

(c) The difference of nearly 4·5 per cent. in the two measurements, is due to a push given to the vertebræ concerned by the downward thrust of the back muscles during Nauli.

(d) The same student is subjected to this and the previous experiments. Thus an opportunity to compare the condition of the lumbar region during the two exercises of Uḍḍiyana and Nauli is available. A comparison

between 10 — (a) of the last page with 10 — (a) of p. 90, shows that the downward thrust of Nauli after Uddiyāna effects a reduction of 8·7 per cent. in the space covered by the upper four lumbar vertebræ.

MĀDHAVADĀSA VACUUM

Our experiment proving the creation of the Mādhavadāsa Vacuum has already been given in the last issue. The anti-peristalsis hypothesis was also discussed there. Now we propose to examine this hypothesis still further and also to give our view of the genesis of the Mādhavadāsa Vacuum.

THE ANTI-PERISTALSIS HYPOTHESIS

The rise of water through the rectal tube during Basti is so conclusive an evidence that further argumentation to refute this hypothesis might look unnecessary. Still there remains the possibility of the rise of water being due to the combined action of anti-peristalsis and the Mādhavadāsa Vacuum. The partial vacuum may be responsible for raising water through the rectal tube, nay, even through the descending colon; but from the end of the transverse colon the fluid is controlled by anti-peristalsis and taken backward.

There is experimental evidence available to show that anti-peristalsis occurs when enemas are administered. It has been observed by Cannon in the case of cats. The waves of contraction started from the splenic flexure and travelled backwards driving the fluid to the cecum.

We shall presently prove that even this anti-peristalsis is absent in the case of Nauli. But supposing that it is present, it cannot prove Nauli to be unnatural as anti-peristalsis is quite usual in these regions. Dr. Hurst has observed this phenomenon occuring in these parts of the colon in a series of experiments carried out upon healthy men.

But really speaking whether usual or unusual, no anti-peristalsis occurs during Nauli in any part of the colon. We have X-Ray evidence to prove our statement.

Radiograph IV represents the condition of the colon contents during the central aspect of Nauli. In Basti this very aspect is used to draw water into the colon. The external appearance of the abdomen during this aspect is illustrated in Fig. XI in the last issue. Now if Radiogragh IV is examined, it will be found that the contents are thickly crowded in the transverse colon, whereas their distribution in the ascending colon and cecum is thinner. This would not have been the case if the contents were under the grip of anti-peristalsis. The concentration in the cecum would have been the greatest and that in the transverse colon less. For to explain the force with which water is driven into the colon during Basti, we must assume a very powerful anti-peristalsis ; and this would drive the liquid back to the cecum which would consequently be fuller than the transverse colon. But the facts as they are noted above, are just otherwise; and require us to admit the absence of anti-peristalsis during Nauli.

It may be pointed out here to the opponents of the anti-peristalsis hypothesis that no evidence has been upto now adduced to show that the sigmoid and the descending colon remain free from the anti-peristaltic action during Nauli. We have to admit that no experimental evidence of a *conclusive* character has been gathered upto now in this regard. But even here we have some evidence that may prove our position with probability though not with certainty. A reference to Radiograph IV will show that *in all probability* the sigmoid is more crowded with barium than the descending colon. Now under the anti-peristalsis hypothesis this would be absurd. On account of the anti-peristaltic action the contents of the sigmoid should have been driven to the descending colon. At any rate the latter should have been fuller than the former. But *in all probability* it is not, and proves the absence of anti-peristalsis even in these sections of the colon.

Although our experimental evidence is weak, reason is strongly for us. Does it stand to reason to suppose that the practice of Nauli induces anti-peristalsis exactly where it is

unnatural, when it does not start that action in parts where it is quite normal ? We are sure that the answer will always be in the negative.

Thus the anti-peristalsis hypothesis being ruled out of court and the vacuum theory being experimentally proved, it remains to be explained as to how the Mādhavadāsa Vacuum is created.

THE GENESIS OF THE MĀDHAVADĀSA VACUUM

In order that the genesis of the Mādhavadāsa Vacuum may be clearly understood it is necessary to remember a few physiological facts about the colon.

Fermentation is ever going on in the large bowel, especially in the cecum and the ascending colon. During these fermentative processes quantities of carbon dioxide and other gases are constantly liberated and accumulate in the colon causing its dilation. These facts are often observed during operative work. If portions of bowel enclosed within the grasp of intestinal clamps are unclean, the local contents set free carbon dioxide and other gases which being unable to escape, distend the bowel wall. But if the intestinal portions are cleaned, the enclosed bowel remains in a collapsed condition, as no gases are produced there.

Under these circumstances the perpetual production of these gases would have so distended the bowel that it would have soon gone out of use. But an arrangement is made to remove these gases and to reduce their intestinal quantity to a comfortable measure. The colon is internally lined with the mucous membrane. Behind this membrane are blood vessels that supply and drain the bowels. Thus the partition between the blood stream circulating through these vessels and the gases accumulating in the colon, is so thin that the gases find their way to the blood stream, and are carried away with it, especially with the venous blood. The physical laws governing this absorption of gases need not be discussed here. But the

clinical evidence proving the particular character of gaseous absorption may be noted in passing.

Whenever the blood supply of a particular portion of the colon is interfered with, there occurs an acute dilation of the organ in the parts concerned. This is best observed in cases of *thrombosis* (coagulation of blood) of the colic veins. The conclusion is clear. Venous blood flow being stopped, the gases do not find their way to escape and with an ever increasing accumulation distend the affected parts. The same results may be experimentally produced. We quote the very words of the author of these experiments.

" If an animal's abdomen is opened and the main veins of a section of the colon are ligatured or clamped, so that the venous flow from that portion of the colon is entirely arrested, and the abdomen is again closed, it will be found in an hour or two, if the abdomen be reopened, that this portion of the colon has become considerably dilated. The affected portion of the colon is found to be dusky in colour and much distended with gas. If some of the gas is removed with a clean glass syringe and tested it is found to be principally carbon dioxide. "

This arrangement of reducing the gaseous pressure in the colon is so complete that in healthy persons gases are kept very comfortably controlled. In our experiments with the barometer we invariably found them just counterbalancing the atmospheric pressure. We by no means want to suggest that the gases maintain uniform pressure throughout the colon. Our data are yet too insufficient to authorize any such conclusion. We have simply stated our experience.

Now the condition of the colon partially or fully collapsed or otherwise, will depend upon the relative pressures exerted upon it by its contents including gases, from inside and by the abdominal walls and other abdominal viscera from outside. The volume of the colon gases will depend upon the space they are allowed in the colon. If the space is reduced, their volume will decrease; but according to Boyle's law, their pressure will

increase proportionately. If, however, the space is enlarged, their volume will increase but their pressure will decrease in due proportion. In both the cases it is understood that other circumstances continue to be the same. Now if on account of the increased volume of gases, their pressure in the colon grows lower than that of the atmosphere, vacuum will be created in the colon.

This is exactly what happens in the exercise of Nauli. The isolation of the recti and elevated position of the diaphragm increase the capacity of the abdomen. This increased capacity reduces the intra-abdominal pressure and allows the colon to dilate under internal gas pressure. Thus the volume of the intestinal gases is increased leading to a proportionate decrease in their pressure. This decreased pressure causes the barometer to fall when connected with the colon during Nauli and indicates the Mādhavadāsa Vacuum.

BASTI

or

YOGIC FLUSHING OF THE COLON

A reference to this practice has already been made in the last issue of this journal. (Vide p. 26). Basti is the act of flushing the colon by means of Nauli with or without the help of a rectal tube.

TRADITIONAL TECHNIQUE:—

A student was admitted to the course of Basti in old Yogic schools, only after he had been well established in the practice of Nauli. This was necessary to avoid the possible retention of water in the large bowel after flushing. By prolonged abdominal exercises such as Nauli and others, the colon gets toned up, the abdominal walls become strong, the expulsive power of the colon and the rectum largely improves. Thus almost the whole quantity of water taken in is ejected, and there is left no chance of the retained water damaging the bowel. When the master saw that the required stage had arrived, the pupil was taught how to prepare a rectal tube. A hollow piece of tough bamboo stick with a bore of nearly three-eighth of an inch in diameter, was selected. By chopping off the thick walls of this cylinder and reducing its length, it was turned into a smooth tube, four inches in length, having a thin wall of one-sixteenth of an inch in thickness. The two ends were well rounded off. We have personally made use of such a tube and from our experience we can say that it is quite comfortable an article.

In olden days Basti was practised generally by the river-side. The student stood in the clear water of the stream so deep as to reach the umbilicus, and held himself in readiness for Nauli with a slight forward bent of his trunk. Then the tube was well lubricated, generally with ghee, and slowly introduced into the rectum. Nearly one-third of it was kept out and only

two-thirds were inserted. Then followed the isolation of the recti (Nauli-Madhyama), as shown in Fig. XXXVII. With this water rushed into the colon. No rolling manipulations of the abdominal muscles were to be undertaken. The recti were to be maintained in their isolated position as long as possible. When the breath could no longer be held out, the tube was slowly extracted from the rectum and the anal sphincters were closed. Normal respiration was then allowed to start.

At this point the student left the stream and took his stand upon the sandy bank of the river. Here he tried to retain water as long as he could. In the meanwhile, however, he kept himself quite busy practising Nauli, complete rolling manipulations being made. When ejection would become imperative, the pupil allowed his bowels to be unloaded with a stoop. If any quantity of water was left behind, another round of Nauli would be quite competent to expel the same. If the lingering liquid should prove to be obstinate the Peacock Pose (Fig. XXXIII), was practised and the undesirable fluid got rid of. The rectal piece was dispensed with when the student could open his rectum by means of muscular action alone.

MODERN CHANGES IN THE TECHNIQUE:—

The principal features of the traditional technique will continue to be the same, perhaps, for ever, because they are so wonderfully perfected. Some of the minor aspects, however, require a change in order that they might suit modern requirements. Modern civilization has resulted in concentration in large cities making a riverside life almost impossible. Even in India where yet a majority of population inhabits villages, repeated famines have so affected river currents that a clear running stream flowing over a sandy bed and having the required depth has become a scarcity. Under these circumstances the use of a large tub has become almost common in India. This again is full of difficulties, and appears prohibitive to people residing in small rented rooms in cities like Bombay. We recommend small enamelled trays as a very convenient substitute for the unwieldy tubs. The trays should be just large and deep enough to allow

the anus to be dipped an inch below the water surface. As the water rises into the colon on account of a partial vacuum created in it, deeper water is not at all wanted for Basti. A bed-pan or commode may be used for unloading the bowels, or the usual latrine arrangements may be taken advantage of. When a tray is used for holding the original clean water, it is unnecessary to point out that Basti can be practised only in a squatting posture as shown in Fig. II in the first number.

The rectal tube of bamboo may also be advantageously replaced by a tough rubber tube. The vaginal piece generally supplied with the modern enema with its top removed, serves a good purpose.

Many students of Yoga look to be under the impression that the larger the quantity of water sucked up the better is the bowel flushed. To our mind this impression is somewhat inaccurate. Yogic Basti is so perfect that even a pint of water can be spread over the whole colon and ejected with the other bowel contents. In pathological conditions, when one flushing does not satisfactorily clear the large intestine, two flushings may be attempted at half an hour's interval with small quantities of water. Very large quantities have the disadvantage of distending the bowel without any corresponding advantage. Yogic Basti provides an automatic check, inasmuch as it allows only a measured quantity of water to flow in.

Again Yogic tradition required students of Basti to be very careful about their diet. Only the noon meal was allowed and that too of rice and a particular kind of pulse. Ghee was prescribed but very sparingly. Large quantities of buttermilk were recommended. The motive was to render the colon as sterile as possible and to prevent the least possibility of auto-intoxication.

Now when Basti is practised as a preventive measure, this strict dietary need not be followed. Still it is desirable that the evening meal is light and all irritants are avoided. When, however, Basti is adopted as a curative agency, the old prescription is likely to be very useful.

NOTE—

Morning is the best time for Basti. It is practised after the normal motion of bowels. No food is allowed before this flushing, because the exercise of Nauli which forms an essential part of Basti so much stimulates the intestines, that owing to the peristalsis which it sets in and the pressure it exerts, food is hurried on through the alimentary canal without being digested. This point will be discussed with radiographic evidence in the next issue. If Basti is at all to be practised in the evening or at night some six hours should be allowed to go by after the last intake of food.

Fig. XXXII

Preparation for Mayūrāsana.

Fig. XXXIII

Mayūrāsana or The Peacock Pose.

(Side view)

MAYŪRĀSANA

or

THE PEACOCK POSE

THE NAME :—

This pose is called Mayūrāsana because it imitates the deportment of a peacock with its heavy plumage stretching behind him. Mayūra means a peacock.

THE TECHNIQUE :—

To start with the student kneels on his seat and brings together his forearms down upto the wrists. The elbow-joints are put in close contact with each other so that they, provide a suitable fulcrum to support the horizontal body, during the full display of the pose. The palms and fingers are made to stand for the feet and claws of the peacock. Their position, however, is reversed, the palms being given a backward direction. It is needless to say that the fingers afford a very good contrivance for adjusting the balance. (Vide Fig. XXXIII).

On the fulcrum thus prepared the body is stretched out in a straight line parallel to the seat. The elbows are placed on the abdomen just below the umbilicus. The forearms do not stand exactly at right angles with the ground, but are a little inclined to the front. The head is raised and the chin thrown out in order to counter-balance the heavy legs. The whole body is held like a bar resting on a fulcrum. (Vide Fig. XXXIII).

A beginner should hold his breath so long as the pose lasts. Quite an amount of muscular energy is required

for this exercise, especially in the beginning; and this energy can best be had with controlled breath. But as the practice advances and the muscles get into the habit of doing this type of work, less energy is needed; and then breath may be allowed to flow as usual even during the exercise.

As a complement of Basti the pose requires a change in the technique. The legs, instead of being held together and parallel to the ground, are to be spread out and raised imitating a proud display of the peacock's plumage.

The change has a physiological purpose to serve. Parallel and horizontal legs require the glutaeus maximus[1] and the levator ani[1] to be fully contracted. The internal anal sphincter is also tightly closed. This is quite desirable when the pose is to be practised for itself, because it helps to increase the intra-abdominal pressure which is one of the advantages sought in Mayūrāsana. But when the exercise is done as a sequel to colon flushing, its aim is to drive out the lingering liquid from the large bowel. This requires the levator ani and the anal sphincter to be in a relaxed condition. In order to make this relaxation possible the legs are spread out. It is to be remembered that the glutaeus maximus remains contracted even in this condition. The contraction of the glutaeus with a simultaneous relaxation of the levator ani, requires some practice in muscle control. In traditional Yogic schools students are not allowed to practise Basti unless they master this essential technique.

NOTE—

Points of study will be noted on some other occasion when this pose will be taken up for independent treatment. Here it is given only as a complement of Basti.

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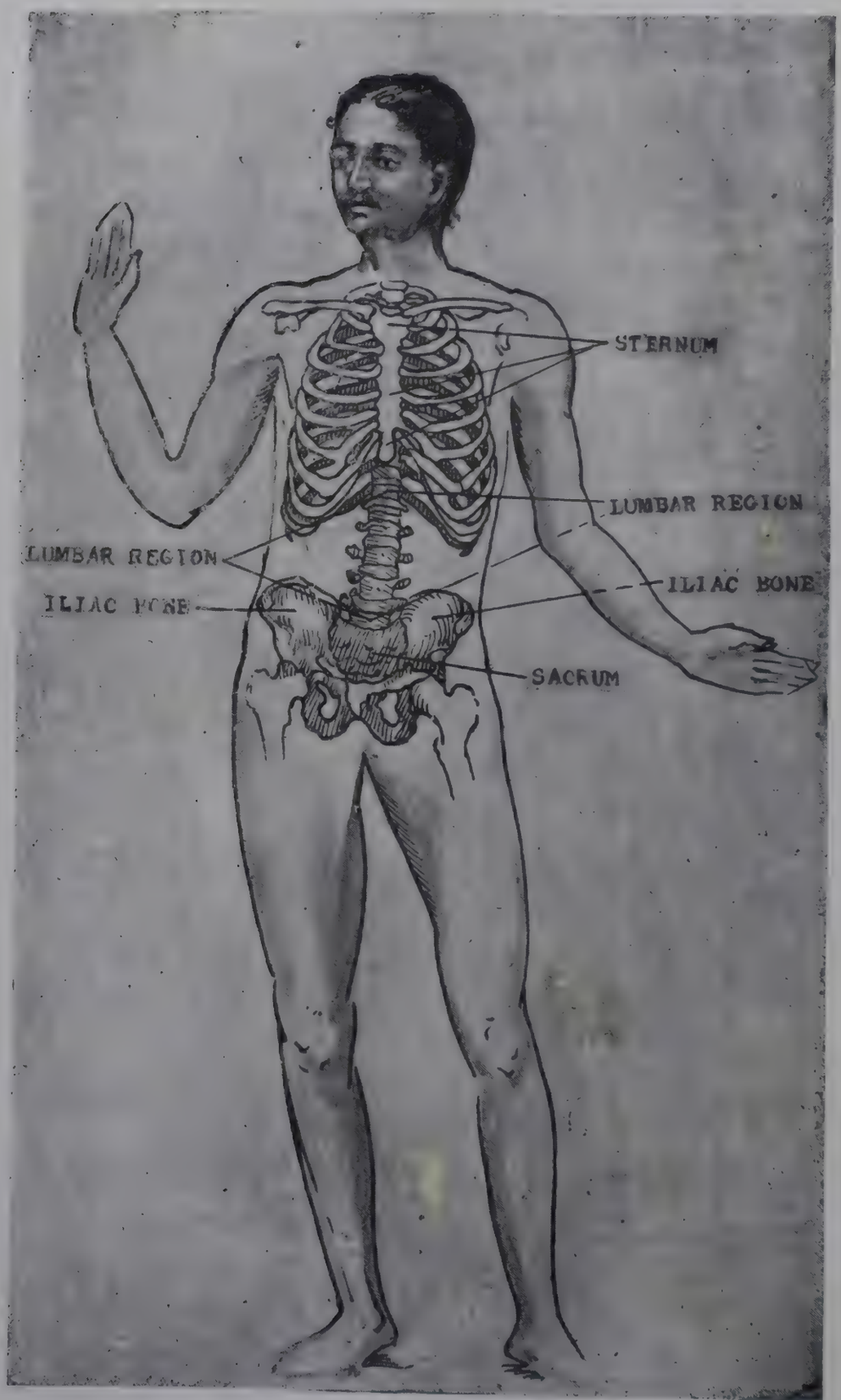
1 See foot-note on p. 144.

The Semi-Scientific Section

N. B.—Instruction in Yogic culture higher as well as lower will be given gratis at the Āś'rama to everyone that earnestly seeks it.

Fig. XXXIV



The Trunk.

A NOTE ON THE ABDOMEN

THE ABDOMEN

We have already referred to the vertebral column in the last issue of this journal. This column of bones supports in its front, directly or indirectly, two great cavities of the human body. The upper is called the chest or thorax and the lower is called the belly or abdomen. The thorax consists of the twelve dorsal vertebræ behind, of twenty-four ribs, twelve on each side, which spring from the vertebræ behind and arch forward, and of the breastbone or sternum. (Fig. XXXIV). These bones are covered over with muscles and other soft tissues; and comfortably hold within their limits the heart, the lungs, etc. Thus the organs situated in the thorax are protected by bones on all sides except at the bottom where a big muscle, called the diaphragm, forms the floor. Unlike the thoracic part, the abdominal cavity is poorly supplied with bony protection. The hip-bones below and the slender vertebral column behind are the only bones that support the abdominal cavity. (Fig. XXXIV). The walls of the abdomen are composed of muscles all round, and the roof also consists of the muscle diaphragm which divides the two biggest cavities of the human body. Thus it will be seen that the abdominal walls consist of a muscular structure only indirectly supported by the ribs above and the hip-bones below. The abdominal muscles will be presently studied in detail. But the point to be specially emphasized here is that the cavity is mainly surrounded by muscular coats which perpetually press upon the organs, such as the intestines, the spleen, the liver which they hold within them. The diaphragm which is a respiratory organ, descends upon the abdominal viscera with every inspiration and constantly adds to the intra-abdominal pressure exerted by the outer muscular walls.

MUSCLES OF THE ABDOMEN

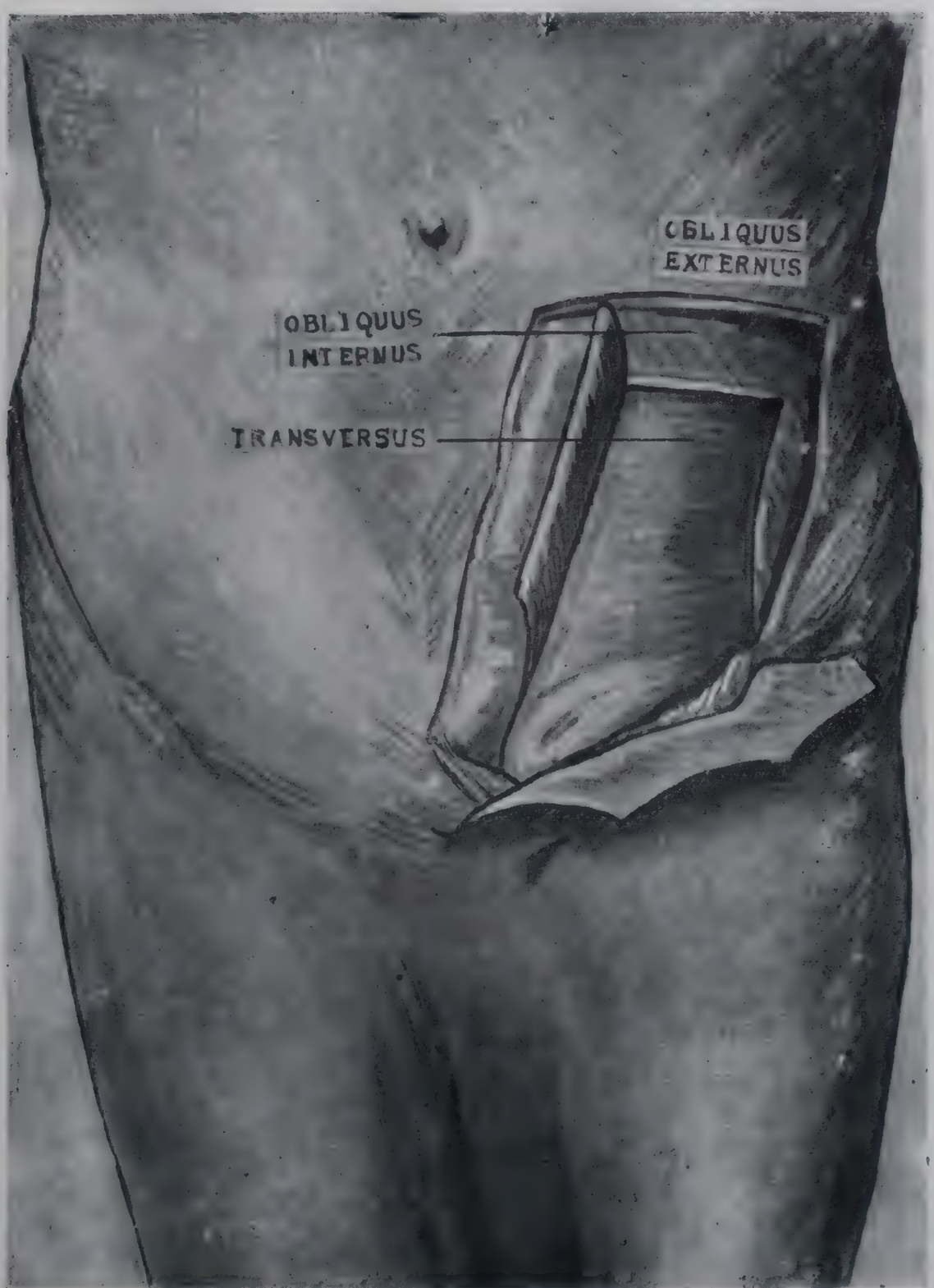
Only those muscles that play a prominent roll in determining the health of the abdominal viscera, will be noticed here. They

are the diaphragm which covers the top of the abdomen; the iliacus, (Fig. XXXIX), obliquus externus, obliquus internus, tranversus, (Fig. XXXV), and rectus, (Fig. I of the current volume), which stand at the sides and in front of it; and the psoas major, psoas minor, and quadratus lumborum which lie behind it. (Fig. XXXIX). Now we shall take up these muscles either singly or in groups, and study their actions.

The Diaphragm is a dome-shaped muscle which separates the thoracic from the abdominal cavity, its convex upper surface forming the floor of the former, and its concave under-surface the roof of the latter. Roughly speaking this muscle is attached to the bony walls of the chest. It has a special hold upon the upper lumbar region, the back muscles of the abdomen, and the transversus abdominis. Being an important respiratory organ, it is ever rising and falling with the movements of the breath. Under these circumstances, however, the curvature of the diaphragm is scarcely altered, the dome moving downwards nearly parallel to its original position and pushing before it the abdominal viscera. The descent of these viscera is permitted by the extensibility of the abdominal wall. In all expulsive acts the diaphragm is called into action to give additional power to each effort. Thus before sneezing, coughing, laughing or vomitting, and previous to the expulsion of urine or fæces or of the fœtus from the uterus, a deep inspiration takes place.

The obliqus externuus, obliquus internus and transversus are the three flat muscles situated on the lateral and anterior part of the abdomen. They are placed below one another and together form the three muscular coats of the abdominal wall. There are two sets of these, one on the right and the other on the left side of the body. The obliquus externus is the largest and the most superficial of the three. (Vide Fig. XXXV). Below it lies the obliquus internus which is thinner and smaller than the one above it. The innermost is the transversus which almost completely encircles the abdominal cavity. Broadly speaking the three muscles are attached to the ribs above and hip-bones below. Their actions

Fig. XXXV



The Three Flat Muscles of the Abdomen
Standing at the Sides and in Front.

Fig. XXXVI *Fig. XXXVII* *Fig. XXXVIII*

Right Side Muscles Active. Right & Left Side Muscles Active. Left Side Muscles Active.

Fig. XXXIX

Back Muscles of the Abdomen.

are similar in nature. We can observe the work of the obliquus externus even in our ordinary life. When the thorax and pelvis are fixed these oblique muscles compress the abdominal viscera; and thus assist in expelling the fæces from the rectum, the urine from the bladder and the fœtus from the uterus. If the pelvis alone is fixed, the trunk is bent forward when both the right and left muscles act, (Fig. XXXVII); if the muscles of one side act, the trunk is bent forwards that side and the front of the abdomen turned towards the opposite side. (Figs. XXXVI and XXXVIII). If the thorax be fixed, the muscles, acting together, draw the front of the pelvis upwards as in the act of climbing.

The rectus abdominis has already been referred to in describing the technique of Uḍḍiyāna and Nauli in the last number of this journal, (Vide pp. 9 and 25). It is a long flat muscle, broader above than below, which extends along the whole length of the front of the abdomen from ribs to pubic bones. The rectus acting from below depresses the thorax and in continued action bends the vertebral column. It is also a powerful compressor of the abdominal viscera.

The psoas major, psoas minor and iliacus arise from the front of the backbone in the lumbar region and from the hollow of the haunch-bone. They pass over the edge of the pelvic bones to the thigh-bone below and there become attached to it. (Vide Fig. XXXIX).

The function of these muscles is to bend the hip-joint. Now if the trunk be fixed and these muscles are contracted, they will fold the thigh upon the abdomen; whereas if a man takes a firm stand upon his legs and contracts these muscles, his trunk will bend forward.

The quadratus lumborum is irregularly quadrilateral in shape and broader below than above. It stretches from the hip-bone to the first rib. (Fig. XXXIX). By its contraction it helps the trunk to bend.

THE PERITONEUM

These and other muscles together with other soft tissues make the inner surface of the abdominal cavity very smooth. The rough bones are covered up. In order to add to the smoothness, however, the whole cavity is lined with a delicate membrane called the *peritoneum* that acts like a sack for holding the abdominal viscera. The greater part of the digestive tube, the liver, pancreas, spleen, kidneys etc., all lie within this soft membrane.[1] It must not be supposed, however, that these organs are piled up there in a loose heap. They are kept to their respective places by the peritoneum. Though this membrane stretches itself along the abdominal wall, it often leaves this wall and forms itself into folds which either cover the inner organs or are attached to them. For instance, the peritoneum covers the liver in its folds, whereas it is only attached to the small intestine. Its connections with the bowels are called the *mesenteries* and those with the colon the *mesocolon.* The mesenteries are the mesentery (mesentery proper), the mesenteriole of the appendix, the transverse mesocolon, and the sigmoid mesocolon.

The mesentery is a broad fan-shaped fold of peritoneum connecting particular parts of the small intestine with the posterior wall of the abdomen.

The mesenteriole is a triangular fold of peritoneum which clothes the appendix and is attached to the lower end of the mesentery.

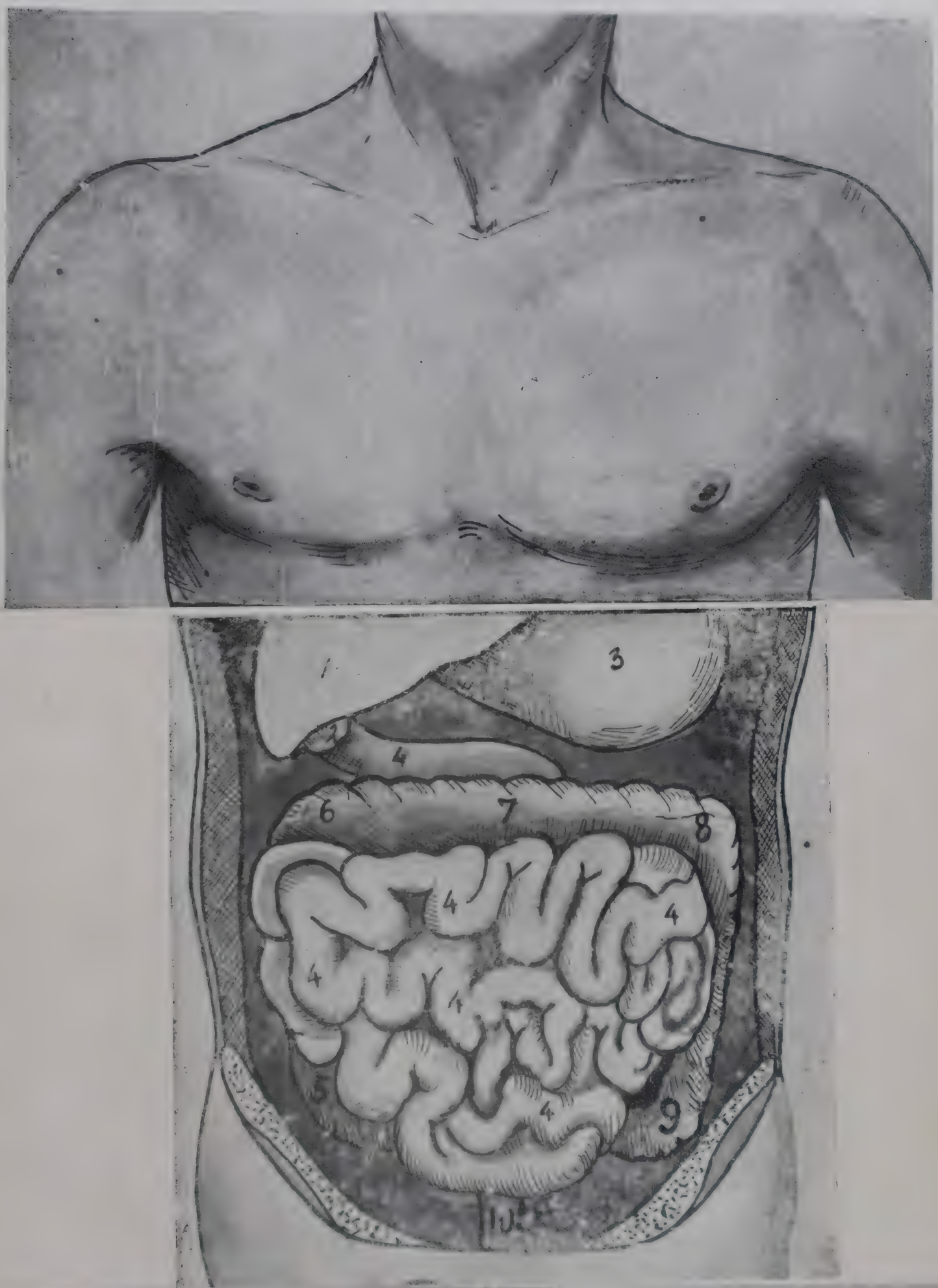
The transverse mesocolon is a broad fold connecting the transverse colon to the posterior wall of the abdomen.

The sigmoid mesocolon is a fold of peritoneum which attaches the sigmoid colon to the lower abdomen.

The mesenteries supply a channel for the blood-vessels and lymphatics to pass to and from the colon.

1 Vide Figs. XL, XLI and XLII.

Figs. XL, XLI, XLII.



Abdominal Viscera.

1 The Liver. 2 The Gall-Bladder. 3 The Stomach. 4 The Small Intestine. 5 The Cecum. 6 The Hepatic Flexure. 7 The Transverse Colon. 8 The Splenic Flexure. 9 The Sigmoid. 10 The Rectum. 11 The Pancreas. 12 The Spleen. 13 The Kidneys. 14 Ureters. 15 The Bladder.

The free surface of the peritoneum is smooth and is also lubricated by a small quantity of serous fluid. Hence the viscera can glide on the wall of the cavity or on one another with the least possible amount of friction.

NOTE—Figs. XL, XLI and XLII will give a correct idea regarding the relative positions of the different viscera in the abdominal cavity.

CECAL CONSTIPATION

PART II

In the first part of this article we have taken a short survey of the remedies devised by the modern world against cecal constipation. After a brief statement of the theory of auto-intoxication, a reference was made to the operative cure. This was followed by remarks on the use of purgatives and laxatives, and on the advantages of the enema, with a mention of the J. B. L. Cascade, muscular exercises and mechanical treatments. In this part we propose to discuss, at some length, the Yogic cures of cecal constipation; and to institute a comparison between these ancient methods and those of the modern world.

But before we proceed to discuss the Yogic cures, we wish to say a few words again about auto-intoxication, with a view to make our position quite intelligible to our readers.

The statement made in the first part of this article is based on the researches of the eminent French physician, Bouchard, to whom we owe the word auto-intoxication. Matchnikoff, Tissier, Combe, Lane of London and a number of expert medical men all over the world have enthusiastically advocated the same theory; and have recognized the far-reaching destructive effects of the absorption of bacterial poisons from the intestinal tract.

Professor Adami and others, however, hold a different view. They maintain that there is little evidence to show that large quantities of toxins are produced *in the intestines* owing to the bacterial action upon the food-stuffs. They do admit the possibility of production of toxins *within the body*; but they attribute this production to a condition which Professor Adami names "sub-infection". By this is understood the liberation of toxins within the *body cells* by the destruction of bacteria which have passed through the walls of the intestine into the tissue cells. According to the first theory toxins are formed in the intestines;

whereas according to the second, they are formed, not in the intestines, but in the tissues outside the intestines.

Now whichever theory may be correct, it is admitted by the advocates of both that chronic constipation leads to the poisoning of the different parts of the body with toxins produced within the body itself.

But there is another important point regarding the theory of auto-intoxication as it is propounded by Bouchard and others, which requires some explanation. The close relation between a number of dangerous diseases and auto-intoxication advocated by these savants, was at first violently opposed by many eminent medical authorities. Even to-day the voice of opposition is not altogether silenced; but now there are few up-to-date medical men who do not recognize the close relation between chronic constipation and a long list of chronic disorders. Even these few, however, though they do not openly acknowledge the correctness of Bouchard's doctrine, in their practice acknowledge his principles. To take an illustration : they will not admit the etiological relation between constipation and *arteriosclerosis*—a disease that hardens the walls of arteries and increases blood-pressure—but they will start their treatment of the latter by treating the colon of the patient. Paraffin oil and seidlitz powders will be administered and not nitrites that directly lower blood-pressure.

Thus it will be readily seen that there is a fair agreement among scientists regarding the dangerous character of constipation and its importance from the therapeutical point of view. A discussion on auto-intoxication is introduced in this article, not for studying the comparative merits of the different views obtaining about it, but for clearly pointing out the important position constipation occupies in the field of pathology and therapeuties. What applies to constipation in general holds good in the case of cecal constipation in particular, because the latter is only a grave aspect of the former.

Another question which deserves our attention before the Yogic cures are studied, is the etiology of cecal constipation. Because when we know the causes of this condition, we shall be able to see how particular exercises in Yoga can remove these and thus cure the patient of his disorder.

Medical men appear to be unanimous in declaring that the modern civilization is responsible for the universal spread of constipation in the civilized countries. We would like to quote from P. Lockhart-Mummery who is on the whole a much impartial writer.

"Chronic constipation, like many other complaints of the present day, is in most cases a result of modern civilized life. Among native races and wild animals it is practically unknown, but is all too common in civilized communities, and, indeed, forms one of the most frequent disorders of our great cities. Modern methods of dietary and the sedentary character of our daily life are largely responsible for the tendency to constipation which is so prevalent. It is one of the penalties we pay for the comparatively small use we make of our colons." [1]

But this etiological statement is too vague to be of any advantage in understanding the immediate causes of constipation. These may be roughly stated to be two ;—

i The weakness of the abdominal muscles.

ii The degeneration or absence of the normal nervous and muscular control of the colon wall.

We shall take them up one by one.

A reference to the note on the anatomy of the abdomen on p. 109, will make it clear to the readers that the colon is situated in the abdominal cavity, its different parts being attached to the posterior abdominal wall by means of the mesocolon. Hence it seems to be often supposed that the colon is suspended in the abdominal cavity by this mesocolon. But really speaking the

1 *Diseases of the Rectum and Colon* (1923), p. 321.

mesocolon is not a true suspensory ligament of the large intestine. The transverse colon often contains several pounds of matter; and if the mesocolon were made to support all these pounds, it will be very seriously stretched, for it is a weak structure, and all of us would be suffering from the displacement of the colon. The fact is that the colon is merely attached to the back wall through the mesocolon and does not throw much burden upon it. It is the muscles of the abdominal wall that mainly bear the burden of the intestines.

"In a normal individual the abdominal wall is a firm elastic structure which maintains a more or less constant pressure within the abdominal cavity. This pressure has been estimated to be as much in some persons as ten pounds to the square inch. It is probable that it is always in a normal person sufficient to more than counterbalance the effect of the action of gravity upon the abdominal viscera; and that under normal conditions the intestines may be said to float within the abdomen, so that no drag is exerted upon the mesenteries.

"If for any reason the abdominal wall becomes weakened this state ceases to exist, and all the abdominal contents are subject to the effects of gravity, and tend in consequence to become displaced downwards. We see evidence of this in cases where the intra-abdominal pressure is suddenly altered, as, for instance, in persons who suddenly lose a great deal of weight. The loss of fat within the abdominal cavity, where much of the normal fat is stored, results in a decrease of space, greater as a rule than the abdominal wall can compensate for; and we know as a fact that marked loosening of the organs commonly results in such cases. The stomach and colon are displaced downwards, and the kidneys and the liver become more or less loose. The same thing is not uncommonly seen in women after child-birth, when the abdominal wall has been badly stretched, and has been slow in recovering." [1]

1 P. Lockhart-Mummery's *Diseases of the Rectum and Colon* (1923), pp. 327–28.

The abdominal wall not only counteracts the effects of gravity on the intestines but it also stimulates the bowels to action. When, however, the abdominal muscles become relaxed and the intra-abdominal pressure is reduced, this stimulus becomes weak. The stomach and the intestines have a tendency to dilate. In health the food is grasped by the digestive tube as soon as it reaches the throat, and this grip is maintained until the residue of the food is expelled at the other end. But in disease when the intra-abdominal pressure is reduced, the stimulus has grown weaker and the digestive tube is dilated; bowel contents are not pushed forth and stagnation results. In course of time this becomes chronic and dangerous symptoms of auto-intoxication are visible, especially when the seat of constipation is the cecum.

Now it will be readily admitted that the type of constipation that is due to the degeneration of the abdominal muscles, can only be cured by the regeneration of these and not by any other measures. No amount of purgatives and laxatives can render these muscles healthy. The enema is altogether useless in this work. If the drugs and the enema affect anything it is the intestines and not the outward abdominal muscles. They are not only useless in improving the external wall, but they are positively harmful to the bowels. The drugs irritate and render them weaker, whereas the enema leads to a greater dilation of the colon. Muscular exercise is the only right remedy against this type of constipation and we are glad to see that even medical works on surgery are recommending these exercises. Now the exercises of Uḍḍiyāna and Nauli, as they are taught in Yoga, will be found to be of the highest efficacy in this regard. How, we shall try to prove in the following few lines.

Taking up the practice of Uḍḍiyāna we see that it exercises nearly every muscle of the abdomen. Our readers will find in the last issue some details of the muscular movements involved in the exercise; but here we propose to treat the subject at some length, so that even the popular mind can understand it clearly.

As a measure against constipation, Uḍḍiyāna is best practised while standing and the following description will mainly refer to this variety of it.

As stated in the last issue of this journal (on p. 12), the student bends his knees a little and stoops a good deal while preparing himself for Uḍḍiyāna. This is done to secure full scope for the working of abdominal muscles. The practice starts with a complete exhalation. This empties the lungs which are consequently contracted, and allows the diaphragm to rise to a very high level. Then the two recti, the obliquus externus, obliquus internus, and the transversus are all vigorously contracted. This contraction presses these muscles under the ribs and gives a more pronounced forward bent to the trunk than is originally assumed. The psoas major, psoas minor and iliacus also contract in order to co-operate with the above mentioned muscles, and help the trunk to flex. After this a vomitting-like action is done. This consists in strongly contracting the side muscles, thereby vigorously compressing the abdominal viscera and giving them an upward push. The recti also contract further. But they are much relaxed after the upward and inward push is given; whereas the three side muscles stand contracted throughout the pratice, maintaining the new position of the viscera. The diaphragm which stood already very high, now rises higher and occupies the highest possible position in the thoracic cavity. The sudden upward movement of the diaphragm requires the contraction of not only the superficial but also of the deep muscles of the back. Especially the lumbar region to which the diaphragm is strongly attached is well stretched out. In fact the whole peritoneal wall is raised.

Though Uḍḍiyāna involves a vomitting-like action, it should, by no means, be supposed that the practice is unnatural. There is a fundamental difference between the two: vomitting and Uḍḍiyāna. Vomitting is always preceded by an inspiration whereas Uḍḍiyāna by an expiration. Thus in vomitting, on account of inspiration, the diaphragm is lowered down; and as the lungs stand all along expanded, it forms an unyielding

roof of the abdominal cavity. The contracting muscles of the abdomen press the stomach against this stiff diaphragm and force out its contents with the help of anti-peristalsis. But in Uḍḍiyāna the empty lungs allow the diaphragm to rise to its highest level in the thoracic cavity; and the stomach, though pushed up by abdominal muscles, finds ample accommodation in the abdomen. Again vomitting becomes possible only when the stomach is full, but the exercise of Uḍḍiyāna is to be done invariably when the stomach is empty. Thus it will be clearly seen that there is nothing unnatural in Uḍḍiyāna, although it may have some movements in common with vomitting.

Uḍḍiyāna is maintained till the student can conveniently hold his breath out. It is ended by relaxing the abdominal muscles which allow the diaphragm to descend, the lungs to expand, and the breath to flow in.

Though Uḍḍiyāna is a very good exercise for abdominal muscles, Nauli is still better. The reader will find a few lines bearing on the technique of this practice on p. 25, in the last number of this journal. Coming to details we see that Nauli is only a further development of Uḍḍiyāna. The latter in its perfect stage requires the recti to be comparatively relaxed, though on the two sides of these, the two oblique muscles and the transversus stand vigorously contracted. In Nauli, the contracted character of the side muscles is to be maintained; but the recti are to be isolated from them and with the most perfect contraction to be pushed forth. This is accomplished by a downward push of the anterior part of the diaphragm helped in its action by the superficial and deep muscles of the back. When the isolation is complete the abdomen wears the appearance shown in Fig. XXXVII.

One point which deserves special attention here, is the contraction of the thoracic muscles which must accompany the abdominal work in Nauli. Under their action the capacity of the thorax is reduced and the lungs are made to press upon the diaphragm which contracts under their pressure.

But the exercise of Nauli does not end here. Nay, the remaining manipulations of the abdominal muscles are even of greater importance. These consist in making a wave of the muscular contraction pass across the abdomen from the left to the right and from the right to the left. This wave of contraction is followed by a wave of relaxation, the two together giving the abdomen the appearance of an undulatory surface of water. The starting point is the two recti. Throughout the rolling manipulations, one of the recti is maintained stiff, whereas the other is relaxed. Let us start with the left rectus abdominis. While this is kept fully contracted, the muscles of the right half, the right rectus abdominis and the three side muscles, are relaxed and lie flat upon the belly. The three side muscles of the left are kept stiff along with the rectus. Now the left rectus is rolled to the extreme left by making the contraction of the left side muscles more vigorous and the relaxation of the right muscles more complete. When the rectus reaches the extreme left, it itself and the other muscles on its sides are suddenly relaxed; and the right rectus is made to stand fully contracted on the extreme right border of the abdomen. Of course the side muscles of the right also are stiffened; and it looks, as it were, that the muscular wave had, in a moment, transferred itself from the left to the right. The right side muscles are then relaxed and the right rectus made to travel to the middle of the abdomen. Then it itself is relaxed, transferring its contraction to the left rectus which again continues to be rolled to the extreme left, a wave of relaxation following it.

Upto now we have taken into account only those muscles that lie in front and at the sides of the abdomen. Let us now consider those that stand behind the abdominal cavity. The action of the psoas major, psoas minor, and quadratus lumborum deserves notice. As the practice of Nauli requires the trunk to be a little flexed upon the thighs, these muscles remain contracted throughout the exercise. But the vigour of contraction differs in different positions. For instance, when the rectus stands rolled off to the extreme left, the action of these back

muscles is the strongest on that side, but the weakest on the right. The result is that the trunk is more bent on the left than on the right, and the front of the abdomen is turned towards the latter side. (Fig. XXXVIII). As the rectus is being rolled to the middle, these back muscles begin to relax; and by the time the rectus reaches the extreme right, the back muscles on the left side become weak in their action, whereas those on the right stand powerfully contracted. Then the trunk is flexed more on the right than on the left side and the front of the abdomen turns to the left. (Fig. XXXVI). Thus it will be seen that even the back muscles experience a wave of contraction corresponding to the wave passing over the front and side muscles of the abdomen.

The same is the case with the diaphragm. It has already been noticed that during the practice of Nauli the diaphragm stands contracted above the abdominal viscera. Now the isolation of abdominal muscles is possible only with the help of the diaphragm. So in order that a wave of isolated muscles may be made to cross the abdomen, it is necessary for the diaphragm to be thrown into a similar wave of contraction.

Thus it will be seen that every important muscle that goes to form the abdominal cavity is alternately contracted and relaxed during the exercise of Nauli. The action of muscles is shared by every fibre that goes to form them. Hence every fibre of the abdominal wall shortens and thickens, as the wave of contraction passes across it, and subsequently returns to its normal condition as relaxation follows.

There are many abdominal exercises devised by the physical culturists of the East and the West; but none can approach Nauli in its efficacy. No other exercise involves all the abdominal muscles and at the same time requires such vigorous contractions. A system of muscles moving as a whole has a decided advantage over individual muscles moving singly. In Nauli the whole muscular mechanism of the abdomen is made to move simulta-

neously ; and this places Nauli at the top of all the abdominal exercises, as the rest require only a part of the abdominal wall to work.

The following points also are in favour of Nauli.

The efficacy of a muscular exercise mainly depends upon the blood supply it induces to the parts exercised. The volume of blood diverted by a particular exercise, will undoubtedly vary chiefly as the vigour with which it would contract the muscles concerned. But it also varies as the degree of attention that is paid to the working muscles. According to the laws of physiology, blood gathers in every part of the body that is attended to, as shown by all Plethysmograph[1] experiments. It is to take advantage of this physiological law that physical culturists all over the world advise their students to concentrate their attention upon the working muscles. Now of all the abdominal exercises Nauli requires the greatest concentration, because it involves the co-ordination of the largest number of muscles; and necessitates not only that many muscles should take part, but that they must do so in their proper order and in due relation to the action of the remaining muscles. Thus Nauli being the most complicated exercise demands greatest attention and induces largest blood flow to the working parts.

Another point which adds to the excellence of Nauli is its capacity to build a powerful spinal column, especially in the lower thoracic and lumbar regions; and also to tone up the spinal nerves that supply abdominal muscles.

It is admitted on all hands that stretching exercises develop the vertebral column in the most efficient way. The reason is this. These exercises are best calculated to work the muscles which hold the backbone in its place and to promote blood circulation roundabout it. Now the vertebræ also are supplied with blood-vessels ; and when a richer flow of blood is diverted to their side, they get better nourishment, and consequently

1 Plethysmograph is an instrument for recording alterations of the volume of blood in different organs of the body.

grow stronger and healthier. Various appliances for stretching exercises have been constructed by physical culturists and are largely sold in the market. Uḍḍiyāna which forms a part of Nauli, however, constitutes a very good stretching exercise requiring no outside help. A reference to Radiographs I and II in the last issue, will show that Uḍḍiyāna stretches the first four lumbar vertebræ over 5.5"; when in their normal position they occupy only 5.25". This shows a clear stretch of 5 per cent. in the lumbar region. Though we cannot give to-day any radiographic evidence for the lower thoracic vertebræ, we are sure they experience a similar stretch owing to the upward pull given by the diaphragm during Uḍḍiyāna. Again the effect of this pull is increased by the downward push given to the lumbar vertebræ during Nauli proper. The height of the lumbar vertebral column in Uḍḍiyāna, is reduced, in Nauli, by an inch in a foot. [See 10—(d), p. 94]. Thus the two practices Uḍḍiyāna and Nauli, the latter including the former, constitute an excellent stretching exercise, and build a strong lumbar region supporting the abdomen.

Coming to the spinal nerves, we find from the chart given on p. 126, that important abdominal muscles are supplied by spinal nerves arising from the lower thoracic and lumbar regions. Now as Nauli enriches the blood supply of these parts, these nerves are well fed at their very roots and consequently improve in their tone. Thus Nauli not only exercises the abdominal muscles but it also keeps their nerve supply in a healthy condition.

From the arguments put forth in the foregoing paragraphs it will be clear to everyone that Nauli is very effective in building up a powerful abdominal wall, taking care of muscles, bones, nerves and everything. It has, therefore, great efficacy in preventing and curing constipation, arising from the weakness of the abdominal muscles.

These exercises of Uḍḍiyāna and Nauli may be supplemented by the practice of the poses described in the Popular Section of this issue. For persons too weak to start with Uḍḍiyāna and

Nauli, these postures will be of great use to make a beginning. Though these Āsanas cannot compare favourably with Nauli, they are as good as any other curative exercises against constipation.

Thus we see that the weakness of the abdominal muscles, the first of the two causes of constipation mentioned on p. 116, is best removed by Yogic exercises. Next we want to see how far these exercises can help a patient to get rid of the second cause.

(To be continued.)

A TABLE OF ABDOMINAL MUSCLES AND NERVES SUPPLYING THEM

MUSCLES	NERVES
Diaphragm	Lower six or seven intercostal nerves.
Obliquus externus ...	Anterior divisions of the lower thoracic nerves.
Obliquus internus ...	Anterior divisions of the lower thoracic nerves and the first lumbar nerve.
Transversus abdominis ...	Lower thoracic and first lumbar nerves.
Rectus abdominis ...	Anterior divisions of the lower thoracic nerves.
Psoas major	Branches from the second and third lumbar nerves.
Psoas minor	Branches from the first lumbar nerve.
Iliacus	Branches of the second and third lumbar nerves.
Quadratus lumborum ...	Anterior divisions of the twelfth thoracic and upper three or four lumbar nerves.

The Popular Section

N. B.:—The Director of the Kaivalyadhāma entreats every man of means to show his active sympathy for the Āś'rama.

Fig. XLIII

Preparation for S'irshāsana.

Fig, XLIV

Śīrshāsana or The Topsyturvy Pose.

(Starting balance)

Fig. XLV

Śīrshāsana
with
Thighs Folded.

Fig. XLVI

Śīrshāsana
with
Thighs Extended.

Fig. XLVII

Sirshāsana.

(Full pose)

S'ĪRSHĀSANĀ [1]

or

THE TOPSYTURVY POSE

THE NAME :—

This pose is called S'īrshāsana because it requires the student to stand on the head. S'īrsha means the head.

THE TECHNIQUE :—

Some details of the technique have already been noticed on p. 14, in the last issue of this journal. As stated therein the student first prepares his finger-lock and places it in his front, making a convenient angle with his forearms, the finger-lock serving as the vertex. (Fig. XLIII). Then he places his head at the vertex. For this purpose the hinder part of the top of the head is to be used and not the part nearer the forehead. The reason is that during the balanced condition, as illustrated in Figs. XLIV to XLVII, the spine must stand as erect as possible. If the front part is employed the spine would suffer a curve in the cervical region. All this time the student is either squatting on his seat, or kneeling on it as shown in Fig. XLIII. After this he slowly raises his trunk lifting up the lower end of it, and tries to hold

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1 Under this Section, our readers might have expected to find the second part of our article on the Pan-Physical Pose published in the last issue. We regret, however, that a further discussion of that pose had to be postponed as we had to make room for the postures described here. A discussion on Nauli, especially in its bearing on constipation, required a reference to these poses. We have not entered into details regarding these exercises, however. Only such hints as are absolutely necessary for starting their practice, are given here. But even this short treatment has exhausted the space at our command. Hence the second part of the article on the Pan-Physical Pose had to be reserved for the next number.

it perpendicular with the ground. For this purpose he puts the weight of his trunk on three points: the two elbows and the head supported by the finger-lock. He gradually raises his knees and brings his toes nearer to his elbows. When the trunk supported on the head is sufficiently thrown backward, the student finds that he could lift his toes from the ground without standing in danger of a collapse. (Fig. XLIV). All these movements he accomplishes very smoothly, and does not give any jerks to his body, for they are likely to upset the balance rather than establish it. He then draws his knees to his chest, folds his legs, straightens his back, and tries to be firm in his balance in this position. (Fig. XLV). The practice of this first stage of S'īrshāsana is continued over some days, so that the muscles get used to it and their work becomes easy.

When the student can do this first part of the Āsana with ease and grace, his remaining task is very simple. In the second stage, he is simply to straighten out his thighs and bring them in a line with the trunk. (Fig. XLVI). Here the balance is never allowed to go to the back side. The whole work is smoothly accomplished by the contracting muscles of the back and buttocks. The third and the last stage is reached when the legs are opened out; and the whole frame stands at right angles with the ground. (Fig. XLVII).

Just as ordinarily we do not feel the slightest burden on any part of the body, while we are standing on the legs; so by practice, the student, in this pose, does not experience any burden, as the whole body stands perfectly balanced, and the weight is evenly distributed over its different parts.

The balance required for S'īrshāsana is best secured by the methods indicated in the last three paragraphs. People look to be under the impression that they could start their practice of this pose by throwing up their

legs, if they could get somebody to hold them up in the air; or failing the services of an intelligent living being, even if they could get a dead wall for support. The legs are tossed with violent jerks, and these hasty people often find themselves playing the part of a tumbler only minus his acrobatic skill! Even if they fare better, the psychological need of a support is always felt; and these people continue to feel insecure in this posture, even after months of daily practice. But if they try to go without any outside help from the very beginning, they obtain the necessary skill in a few days.

Great care must be taken about the period to be devoted to this practice. The best way is to start with 15 seconds and to increase the time very cautiously. Every symptom should be watched and the least possibility of overdoing one's part be avoided. If proper precautions are taken, there is absolutely nothing in this pose which might lead to trouble. The maximum period should be 24 minutes. We have seen, however, a number of people practising this Āsana for more than half an hour every day, and thereby maintaining very sound health. Some of these are past fifty, and in their communications addressed to us, bear eloquent testimony to the manifold advantages, a regular practice of this pose can give. Some of these benefits will be found discussed in the article on cecal constipation in this and the next issues; but a full discussion of the effects of this exercise must be reserved for an independent article. They are too numerous and important to be noticed casually.

The variety of Uḍḍiyāna described on p. 14 and illustrated in Fig. VI, in the last number, however, may be taken here into consideration. It can be developed from the first stage of this Āsana as illustrated in Fig. XLV. Along with an attempt at Uḍḍiyāna, in order to force open the rectum, some work is required to be done with the levator ani and the anal sphincters.

With every exhalation these muscles are to be contracted and with every inhalation they are to be relaxed. This alternate contraction and relaxation of these parts is technically called As'vinī-Mudrā in Yoga, because it imitates the anal action of a mare after she has excreted the bowel contents. In a few days control upon the parts exercised is obtained; and the sphincters can be so relaxed, that the gases shut up in the colon rush out when the abdomen is pressed in for Uḍḍiyāna. When the abdominal muscles are relaxed after Uḍḍyāna, fresh air rushes into the colon. Thus the colon, or at least the lower part of it, can be flushed with pure air, and a sense of lightness and relief can be fully secured through this As'vinī-Mudrā. Afterwards the sphincters may be closed at will.

POINTS OF STUDY :—

(a) *Blood-vessels* :—

The arch of the aorta, the common carotids, the innominate and the subclavians are all inverted and send a richer blood supply to the brain. Regarding veins, nearly the whole column of venous blood that ordinarily has to rise against the force of gravity, has now gravity in its favour. Consequently the veins are relieved of much of their work, and their valves get ample rest in this pose.

(b) *Vertebrae* :—

The vertebral column stands upside-down. Hence the different vertebræ are now inversely burdened. Normally the lowest of the lot has to bear the greatest burden, whereas the highest the least. But in this pose the highest has to support nearly the whole body, whereas the lowest bears only the lower extremities. Thus the burden put upon the different vertebræ being

inverted, the consequent pressure and stimulus given to any two vertebræ also stands in the inverse proportion.

[The skull that ordinarily has no pressure stimulus given to it in the body, gets the highest of it in this practice.]

(c) *Nerves* :—

As has been noted on p. 52 in the last issue, the 12 pairs of cranial nerves start from the brain, come out through the base of the skull, and are distributed to the different parts of the body. This pose, by diverting a richer blood supply to the brain, tones up these cranial nerves. The spinal cord, 31 pairs of spinal nerves and the sympathetic are directly or indirectly connected with the brain ; and get their due share in the advantages of this Āsana.

This exercise opens another way, however, of approaching the sympathetic. The nerve supply of the rectum and anus is mainly from the sympathetic ; and the nerve endings in the skin at the anal orifice are exceedingly numerous. The work of As'vinī-Mudrā principally lies with this part and through it the sympathetic is probably stimulated.

NOTE—

Ever since we published our articles on S'īrshāsana in the Kesarī, a vernacular weekly that claims the widest circulation in India, a number of persons have taken to the practice of this Āsana. Even before we drew people's attention to the importance of this pose, their partiality to it was great. No student of Yoga that worked for the control and purification of his body could neglect it. Even amateurs took peculiar pleasure in standing on the head and feel refreshed in brain and body. The impression is that anybody and everybody could do this exercise, there being practically nothing that would disqualify a candidate. The impression is quite right so far as people

of normal health are concerned. But there are some serious limitations which cannot be overlooked with impunity.

People often suffer from *earache* or *running ears*. Not only during the attack, but also just before and after it, the malady is sure to be aggravated by the practice of S'īrshāsana. Generally the ailment is accompanied by inflammation in some part of the ear; and pressure exerted on the inflamed parts by this pose makes matters worse. A few remarks, on the anatomy of the ear and the physiology of this pose will make these points clear.

Everybody knows the outer ear and the passage that leads inwards from it. (Fig. XLVIII). This passage is an inch and a quarter long. At the other end of this passage is the *drum* or *tympanum* consisting of a membrane that stretches across and completely closes it. On the inner side of this drum, placed in one of the bones of the head, is a chamber known as the cavity of the middle ear or tympanic cavity. In this chamber there is an opening leading to a tube that passes into the back part of the throat after a course of about an inch and a half. It is known as *Eustachian* or *auditory tube*.

The external passage has open communication with the atmosphere outside. But the tympanic cavity can communicate with the atmosphere only through the auditory tubes. These are, however, ordinarily closed, and shut up within them some air which counterbalances the atmospheric pressure upon the external surface of the drum. Now if an additional amount of air be forced into these tubes, the internal pressure becomes greater than the external; and we feel, as if, the drum is bulging out. This often happens at the time of sneezing. Violent expiration forces open these tubes and drives some extra air into them. The phenomenon may be produced at will. These tubes open during the act of swallowing. Now every act of swallowing compresses the air in the throat. But we do not feel any pressure in the ear during such acts, simply because our nostrils are open, and allow the compressed air in the

Fig. XLVIII

The Ear.

E – The External Ear.
P – The Passage.
T – The Tympanum or Drum.
M – The Middle Ear.
EU – The Eustachian or Auditory Tube.

throat to escape rather than be driven into the auditory tubes. But if the nostrils are held tight and the act of swallowing is done, the compressed air will directly find its way up the auditory tubes which are now open and will put a pressure upon the tympanum. This pressure can be relieved by another similar act, only keeping the nostrils open. The tubes will open and get rid of the extra air, sending it out through the nasal passage.

Again this cavity is thinly separated from the blood-vessels that either pass by it or directly supply it. Any pressure put upon these vessels similarly affects this cavity also.

Now S'īrshāsana requires much muscular effort especially in the beginning and causes heavy breathing. If in this effort the auditory tubes are opened by an attempt at swallowing the salivary contents of the mouth, air is forced into the cavity of the ear; and puts considerable pressure upon the drum and the other parts of the internal chamber. It has been noted above that the blood-vessels are all inverted in this pose; and the blood-pressure in the head is, consequently, very high. The ear has also to bear a fair share of this burden.

Under these circumstances, if the ears are already running, or are otherwise inflamed or diseased, this additional pressure of the pose, instead of helping the situation, only makes it worse. Many people seem to labour under the impression that S'īrshāsana is capable of curing each and every ailment of the organs situated in the head. This impression is due to an obvious lack of physiological knowledge. But ignorance of physiological laws is no excuse. We have heard complaints from different persons that S'īrshāsana has spoiled their ears. The fact is that the ears were already bad and that the improper application of the Yogic remedy only made them worse!

There is another limitation. Some people have peculiarly weak eye capillaries. The bulb of the eye or the eyeball is

composed of three tunics arranged behind one another, the middle one being called the *vascular tunic*. It is so named because it contains a multitude of small arteries and veins whose connecting capillaries form a very close network. During S'īrshāsana increased blood-pressure injures these capillaries, especially if they happen to be weak. Eyes are reddened with blood, and if people persist in their practice, in spite of these warnings of nature, serious troubles follow. Such persons should first strengthen their vascular tunic by simpler exercises in stooping, and then cautiously take to the Topsyturvy Pose. Even persons with stout visual apparatus would do well to make a very small beginning; and develop their practice very slowly but steadily, so that no trouble would be possible.

A third limitation comes through the weakness of the heart. Heavy breathing that sets in on account of this pose puts a strain not only upon the lungs but also upon the heart. This strain is increased by the burden of the abdominal viscera as these press upon the diaphragm. The result is that a weak heart grows weaker, and palpitations and other symptoms follow. It is only the injudicious use of the pose that is at fault under these circumstances. Because there is nothing in the Āsana itself that should strain a heart in normal health. People suffering from heart weakness should first strengthen their feeble organ by means of breathing exercises and then take up this pose for practice.

We shall note only one more limitation and conclude this lengthy note.

Nearly everybody knows what biliousness is, though one may not know the exact physiology of it. Now people having this complaint should never practise this Āsana in the morning. They should better choose the evening time, taking care to see that they allow at least three hours to pass between the last intake of food and the practice. If for some reasons the morning exercise becomes imperative, they should first take half a cup of milk, and then after half an hour start their exercise.

If these precautions are not taken, there is every possibility of the pose promoting biliousness and consequent discomfort, for the following reasons.

The bile secreted by the liver is directly discharged into the small intestine, *only if* digestion is going on. But if the stomach and the small intestine are empty, as they generally are in the morning before anything is taken, the bile is not immediately required for digestion and is stored up in a sack called the *gall-bladder*. From this it flows into the intestine whenever it is required there for digestion. It is to be noted that the duct leading from the gall-bladder opens into the small bowel only within a few inches of the lower end of the stomach.

Now the gall-bladder is situated in the abdomen just below the liver, (Fig. XL); and is pressed hard by the folds of the intestines during S'īrshāsana. This pressure might force some of the accumulated bile into the small bowel and also drive it into the stomach. This bile flow is increased if the liver happens to secrete just at this time excessive quantities of the fluid.

The stomach is not the proper and natural place where the bile should be present. Naturally it is irritated and such symptoms as dull headache, nausea, loss of appetite etc., may be developed.

In the light of this information it will be clearly seen that all these troubles may be avoided by choosing the right time for practising this Āsana. The evening suits all constitutions, because some digestion is then going on in the small intestine; and even if bile is forced into it, the fluid is taken up for the digestive work, and generally does not find its way to the stomach. The same thing happens if some light food is taken early in the morning and the exercise is done after a few hours.

What is said of S'īrshāsana holds good in the case of almost all the muscular exercises. People having bilious tendencies

would do well, therefore, to follow the instructions given here. The foregoing conclusions are based not only on our personal experience but also upon the experience of a number of our students, who could avoid the baneful effects of the bile simply by changing the time of their exercise.

We have elaborated these limitations with a view to put enthusiasts on their guard. The Āsana is as popular as it is important and the chances of its misuse are equally great. This discussion is expected to guide people in their work.

Fig. XLIX

Bhujāngāsana or The Cobra Pose.

(Side view)

BHUJAÑGĀSANA

or

THE COBRA POSE

THE NAME:—

This pose is called Bhujaṅgāsana because the full display of it gives one the appearance of a hooded snake with its neck dilated like a hood under irritation. (Fig. XLIX). Bhujaṅga means a cobra in Saṅskṛita.

THE TECHNIQUE:—

The student first lies prone on his seat with his muscles thoroughly relaxed and his mind concentrated as shown in Fig. LI. This picture, however, represents the student preparing himself for S'alabhāsana and not for the Cobra Pose which requires a somewhat different arrangement of the hands and forehead. While getting ready for the Cobra Pose the student touches the ground with his forehead; and keeps his hands, one on each side of the chest, bending them in the elbows. The soles are made to look upward.

The student then raises his head and bends the neck backward as far as possible. The chin is completely thrown out. During this attempt his chest is kept close to the ground, the trunk, so to say, taking no part in the movement. When the head is fully swung backward, the student begins to work the deep muscles of his back. By their contraction he slowly raises his chest. In the beginning he supports his rising thorax with his hands, gradually increasing the angle between his arm and forearm. But as he becomes accustomed to this practice, he tries to depend upon the muscles of the back alone for throwing back his chest; and though the hands are allowed to work as previously, com-

paratively no burden is now put upon them. He does not give a full backward curve to his spine all at once; but tries to raise his vertebræ one by one, and marks that the pressure of the curve is travelling down the column step by step, till the thoracic part gets a good backward bent. Then he begins to use his hands more actively; and partly with their help and partly with the help of the deep muscles of the back, starts working the lumbar region. Lastly even the lumbar vertebræ are thrown backward in a curve and the whole pressure rests on the sacrum. Here the Āsana is completed, and the whole spinal column makes a deep curve as seen in Fig. L. The student tries to maintain this position from 15 to 20 seconds. Fig. XLIX represents the full pose. It is to be noted here that the backward bent of the neck has not been shown in the accompanying illustration, but is not to be neglected in practice.

During the full pose, the abdominal muscles and especially the two recti are stretched, and the intra-abdominal pressure is largely increased. If just at this time, an attempt is made to contract these muscles, it greatly helps to add to this pressure.

After maintaining the pose for the prescribed time, the student begins to efface the spinal curve and bring down his chest. Here too, he proceeds gradually in his work. First the lumbar curve is obliterated, each vertebra being relieved of its pressure which now travels upwards. The thoracic and cervical curves are effaced in the same way, till the whole spine lies in a horizontal line and the forehead touches the ground as it did originally.

The student, if he is a beginner, does not trifle with his breath during this exercise. It is allowed to flow as usual. But when he is advanced in his Yogic studies and knows how to control his breath, he tries to maintain full inspiration throughout the practice.

The exercise may be repeated three to five times with advantage.

Fig. L

Bhujangāsana or The Cobra Pose.
(Back View.)

POINTS OF STUDY :—

(a) *Muscles* :—

The deep muscles of the back are alternately contracted and relaxed in working out this pose both ways. The exercised muscles gain in health and keep the spine elastic. During their work these muscles induce a liberal blood supply by promoting blood circulation which is ordinarily somewhat slow in this part of the body.

This pose has such a good effect upon the deep muscles, that even a single successful attempt at it, relieves an aching back, if the pain is due to overwork.

A reference has already been made to the work of the recti in one of the paragraphs above.

(b) *Vertebrae* :—

The whole spine receives a steady pull anteriorly, every vertebra and its ligaments having their share in the work. If there be any slight displacement in the spinal column, it is adjusted to the normal condition.

(c) *Nerves* :—

All the 31 pairs of spinal nerves exit through the spaces left between every two adjoining vertebræ. The two gangliated chains of the sympathetic also stand imbedded in the muscles situated on the two sides of the spinal column. This exercise, by promoting the blood circulation of these parts, very favourably influences these nerves and helps them in maintaining their health and activity.

NOTE—

This and the next two poses are very good exercises for the spine. The elasticity of the spine means youth, its rigidity means old age. These exercises keep the spinal

column fully elastic. Those people who find their spine alredy stiffened, should start these exercises slowly. No jerks should be given. Jerks may injure the rigid muscles. What little bent is possible should first be secured and maintained for some time. After a while a deeper curve will become possible. In this way, with a daily practice, the spine can slowly be restored to its original state of elasticity.

Fig. LI

Preparation for S'alabhāsana.

Fig. LII

S'alabhāsana or The Locust Pose.

S'ALABHĀSANA

or

THE LOCUST POSE

THE NAME :—

The pose is called S'alabhāsana because its full show lends one the appearance of a locust with its tail standing at an angle with the ground. (Fig. LII). S'alabha means a locust in Sanṣkṛita.

THE TECHNIQUE:—

As illustrated in Fig. LI, the student lies prone on his seat with his soles looking upwards and his fingers clenched. He stretches his hands along his body so that his shoulders and the backs of his fists touch the ground. He either rests his chin, mouth and nose on his seat ; or his chin alone, the head being thrown a little backward. Then with a full inspiration he stiffens his whole body; and tries to raise his lower extremities backwards, putting his whole weight on the chest and hands. The wrists especially feel the burden of the upturned legs. Throughout the exercise the breath is held in and the knees are kept stiff. In this practice the sacrum shares the fate of the legs and is a little raised with them.

When the student finds that he can no longer hold in his breath, he slowly lowers down his legs, relaxes his muscles, and gradually proceeds to exhale. Here, as in other Ās'anas, there should be no jerks or sudden twists and turns. The whole bodily machine must work smoothly and uniformly.

The pose may be repeated twice or thrice with advantage. Care should be taken not to strain the lungs by unduly prolonging the posture.

It may be readily seen that the trunk and the upper extremities that were put into action during the Cobra Pose, are kept to the seat in this posture ; whereas the lower extremities that were passive in that pose, are actively used in this exercise.

POINTS OF STUDY :—

(a) *Muscles* :—

In this Āsana nearly the whole system of extensors[1] is contracted and of the flexors' relaxed. On account of deep inspiration, the diaphragm occupies the lowest possible level, and presses upon the abdominal viscera. The recti and the other three big muscles situated by their sides are somewhat relaxed, but the pressure of nearly the whole body is thrown upon the abdomen. As a result of all this, the intra-abdominal pressure is extremely high in this pose. The glutæus maximus and the levator ani are fully contracted.

(b) *Vertebræ* :—

The lower lumbar vertebræ and the sacrum are worked up.

(c) *Nerves* :—

The lower lumbar, sacral and coccygeal nerves get a good supply of blood through this pose.

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1 Extensors are the muscles that straighten out the different parts of the body, those that bend them being called flexors. For instance, the muscles that help us in bending the hand at the wrist-joint and also in bending our fingers are the flexors. Opposed to these are the extensors. They enable us to straighten our hand and fingers. The muscles psoas and iliacus referred to in the 'Note on the Abdomen,' (p. 109), are flexors, because, by their contraction, they bend the hip-joint folding the thigh upon the abdomen. This flexing action of the psoas and iliacus is counteracted by the glutæus maximus which is an extensor. Forming the prominence of the buttocks, it opens out the folded thigh and enables us to maintain our trunk in the erect posture.

NOTE—

The full inspiration required by this posture expands the lungs. They are again pressed upwards by the abdominal viscera where the intra-abdominal pressure is very high. This puts a considerable strain upon the heart. So beginners should proceed cautiously in this exercise, and those that have a weak heart or lungs should avoid it altogether. Even stout persons would do well to start with one attempt only. Great care must be taken about the time for which the pose is maintained. Slow but sure is a wise rule of conduct here as everywhere. Ardha-S'alabhāsana is only a changed form of this pose adapted to the needs of weaklings.

ARDHA-S'ALABHĀSANA

or

THE HALF LOCUST POSE

THE NAME :—

The name is not taken from any of the original Yogic texts. It is coined by ourselves to express the adaptation of S'alabhāsana described in the following lines.

THE TECHNIQUE :—

As in the Locust Pose so here the student lies prone on his seat. But he neither attempts to control his breath nor to contract the extensors. He keeps the whole frame of his body in a relaxed condition. Then he tries to raise backward one of his legs, of course, after contracting the necessary set of muscles. This he does so slowly and steadily that little pressure is experienced except on the parts that are actually working. All the while the trunk and the other leg are kept close to the seat. After the upturned leg has described the greatest possible angle, it is slowly lowered down to its original position. Then the other leg is raised and taken through the same movements. Thus the two legs go on working alternately till the desired amount of exercise is done. Control of breath and stiffening of muscles may be introduced as the practice advances, care being taken to see that no strain is put upon the system on that account. After one feels strong enough to tackle the full Locust Pose, it should be taken up for practice.

POINTS OF STUDY :—

The bodily parts used for this Āsana are the same as those exercised in the full Locust Pose with slight differences. Hence the results are nearly identical except that the half pose is very slow in bringing about the necessary effects.

Fig. LIII

Dhanurāsana or The Bow Pose.

(Side view)

DHANURĀSANA

or

THE BOW POSE

THE NAME :—

This is called the Bow Pose because in this posture the body resembles a bow with its string attached to it. The trunk and the thighs represent the bow proper, whereas the hands and legs take the place of the string.

THE TECHNIQUE :—

As in the previous poses, the student lies prone on his seat. He bends his legs in the knee-joint, till they are well folded upon the thighs ; and are available to the hands that try to grasp them in the ankles. When the hands get a good hold upon the legs, the student tries to raise his trunk as well as his knees, till his whole body stands on his seat curving upwards both ways. The whole pressure of his body is thrown upon the abdomen, and the extremities are fully stretched as shown in Fig. LIII. At the end of the Āsana the chest and knees are lowered to the seat. The hands let go the legs which are straightened out, they themselves being made to lie on the two sides of the trunk.

This exercise requires a sudden movement of the body, and care should be taken not to sprain any joint. The Āsana may be maintained for something like five seconds to begin with, the period being increased afterwards according to capacity. During the practice breath may be allowed to flow as usual, or it may be controlled, if this could be done without any damage to the lungs. It is desirable for a novice to keep his knees apart, because thereby, he would be able to secure a greater

curve for his body during this exercise. As the muscles become more and more elastic, the knees should be drawn closer, till at last they are made to stand together, carrying the intra-abdominal pressure to its highest limit. In Fig. LIII the knees are shown close to each other. Fig. LIV gives a back view of the posture.

POINTS OF STUDY :—

It will be readily seen that this posture is a combination of the two exercises, Bhujaṅgāsana and S'alabhāsana. Hence the points of study are nearly the same as in these two poses. Naturally it claims the advantages of both, though on a humbler scale. The intra-abdominal pressure here is not as great as in the Locust Pose ; because, even with full inspiration, the diaphragm does not press upon the abdominal viscera as tightly in this practice as in S'alabhāsana. The deep muscles of the back are exercised much better in Bhujaṅgāsana than in this pose ; because there they are *mainly* responsible for the backward curve of the trunk, whereas in this pose their work is largely done by the hands and legs tugging at each other. Again the wave of contraction and relaxation travelling up and down the spinul column which forms the principal feature of Bhujangāsana is missed here. But this pose has a special advantage which cannot be had of the two that are combined in it. The two recti as well as the other muscles of the abdomen that flex the hip-joints, are fully stretched, in this pose, as the thighs are pulled back by the tugging hands. Again as the pull can be adjusted to the requirements of every individual in this pose, the Āsana may be practised by all persons whether strong or weak.

Fig. LIV

Dhānurāsana or The Bow Pose.
(Back View)

Miscellaneous

Following diseases, especially in their chronic condition, can be effectively treated by the Yogic methods :

1 *Constipation*
2 *Dyspepsia*
3 *Head-ache*
4 *Piles*
5 *Heart-disease (functional)*
6 *Neuralgia*
7 *Diabetes*
8 *Hysteria*
9 *Consumption*
10 *Obesity*
11 *Sterility (certain types)*
12 *Impotence*
13 *Appendicitis, &c.*

Therapeutical advice is given gratis at the Āś'rama to patients coming for consultation.

Arrangements have been made under the supervision of the Āś'rama for patients to stay on payment of actual expenses, Rs. 45/- per mensem.

A FEW PRESS NOTICES

THE MAHĀRĀSHTRA, NAGPUR.

October 22, 1924.

"The aims and objects of this journal together with the experimental and critical scientific information given in the first number, clearly indicate the importance of this quarterly. Physical culture is being subjected to experimentation in America, and the periodicals of that country publish scientific criticism on the results. Experimental evidence shows that Yoga is not a mystical nonsense, but that it largely influences the physical and mental development of man. American and European physical culturists are busily engaged in propounding theories in this regard. But in India, like all other ancient cultures, Yoga has come to a standstill ; and the educated Indian does not attach the least importance to it. Under these circumstances, the work started by Shrimat Kuvalayānanda deserves not only our congratulations, but also our support. The scientific character of his work is placed beyond all doubts, as he makes no concession for blind faith. *Yoga-Mimansa* is the first journal in India publishing scientific and experimental criticism on Yoga. The magazine edited by Shriyut Aravind Ghose discussed only the philosophical aspect of Yoga. And although his discussions took into account modern discoveries, they did not record any new experimental evidence, in spite of the fact that such evidence was rendered essential by the vital relation which Yoga has with both mind and body. The work of Shrimat Kuvalayānanda is more comprehensive and progressive. Hence it is the duty of every educated and monied Maharashtriya to help this scientific study of Yoga." *

THE BOMBAY CHRONICLE, BOMBAY.

October 26, 1924.

"We welcome the first issue of the magazine. It publishes with copious illustrations some of the researches on the

Yogic System of physical culture carried on according to modern scientific methods....

"The present number is devoted solely to Hatha-Yogic exercises or things physiological, and does not contain even one article on Yoga proper, that is, mental and spiritual culture. It will not, therefore, be surprising if some of the readers get this wrong impression that Yoga is only a system of physical exercise and nothing else. The Kaivalya-dhāma's attempts in carrying on physiological researches are very laudable, as health is the primary requisite of spiritual life. But it would be a pity if the whole energy of the institution is spent up in conducting investigations only on physical culture and therapeutics."

THE INDIAN SOCIAL REFORMER, BOMBAY.

November 1, 1924.

"The Ashrama Kaivalyadhāma, in Lonavla, has started a quarterly journal called the *Yoga-Mimansa*, with the object of expounding the Yoga system from a physiological point of view. In the first number several photographs are given of the Yogic postures, but the most interesting are the radio-graphs showing the changes produced in the body by the exercises. The journal is edited by Shrimat Kuvalayānanda (Prof. J. G. Gune). While we welcome the attempt to investigate the ancient system by experimental methods, we think a word of warning is necessary against laymen trying to practise Yoga from the descriptions and photographs contained in the journal. Such a warning is implied in the *Editorial Notes*.... But it is desirable to have a more explicit caution to laymen against trying to dabble in Yogic practices without proper guidance."

UNITED INDIA AND INDIAN STATES, DELHI.

November 22, 1924.

"The importance of Yoga as an art of healing was long recognized in India, and it was practised especially by

the Yogins for curing ailments which arose out of irregularities in Yoga practices. Though the ordinary diseases were treated according to Hindu medical science called Āyurveda, men suffering from incurable diseases had to be placed under the Yogins as their last chance for a cure, and the results in many cases used to be miraculous. Yoga for centuries was an unwritten science whose field of operation was restricted to the subjective world, and physical culture or physiological side of it was only a stepping stone.... It must be said to the credit of the Ashrama Kaivalyadhāma of Lonavla that it has started research in this direction, and it is for the first time that Yoga is being subjected to scientific experimentation and results already arrived at promise of a bright future.

"The idea is as novel as it is laudable. Like Radio Therapeutics the Yogic Therapeutics have a great future before them, and the scope of the latter is certainly much wider than the former.... But a big and delicate undertaking like that is naturally an expensive one and much of its success will depend on the full hearted sympathy and support of the public."

CURRENT THOUGHT, TRIPLICANE, MADRAS.

November, 1924.

"The objection is frequently raised against Indian Yoga and philosophy that the truths enunciated therein, though based on subjective spiritual experience, have not been examined by the tests of modern experimental science. This defect is sought to be removed by the Kaivalyadhāma, an Ashrama founded in the beautiful heights of Lonavla to carry the spirit of modern scientific research and method of psycho-physiology into the field of Yoga and philosophy. This is a great and noble task pregnant with immense possibilities for the expansion of knowledge and the spiritual and material welfare of mankind. Lovers of Truth, and particularly those who wish to see India's ancient and priceless treasures of wisdom vindicated before the modern world of science and utilized for the welfare of the world, have no better cause to encourage."

NAVA-SANGHA, CHANDERNAGORE.

December 21, 1924.

"The Kaivalyadhāma Ashrama from which the organ is published thus appears to be doing very important work, having for its main ideal the co-ordination of Western and Eastern self-culture and discipline, which have long proceeded along separate currents, unrecognisant of each other. This integral ideal of wedding together the divorced tendencies of exclusive materialism of the scientific Western world and the exclusive spirituality of the Eastern Yogins is quite in tune with the spirit of the age and makes the Ashrama deserve our fullest brotherly sympathy. It is a bold venture and we wish every success to the noble enterprise undertaken by the organizer, for his success means a new and synthetic vindication of Indian thought and culture to a proud yet doubtful modern world.

"This October number of the quarterly magazine is rich both in style and matter and so far leaves nothing to be desired. One of its main features lies in its copious illustrations, representing Yogic details about Asana, nervous Chakras, etc.—a subject hitherto confined to mystical literature—which has been brought before the popular gaze as a highly instructive and exhaustive field of study and placed under careful scientific treatment, experiment and interpretation."

THE VIVIDHAJNĀNAVISTĀRA, BOMBAY.

December, 1924.

"We are sincerely sorry to note that the purely vernacular reader cannot take advantage of this beautiful journal. The treatment of subjects is based on personal experience. Copious illustrations are given. This has made the whole exposition so easy that there is little difficulty in understanding the subject. This work of Shrimat Kuvalayānanda is extremely laudable and deserves to be patronized." *

THE BHISHAGVILĀSA, AHMEDNAGAR.

January, 1925.

"Medical men educated both in the modern and ancient fashions, are likely to be greatly benefitted by the researches recorded in the *Yoga-Mimansa*. We believe that the method of treatment adopted in the Yoga-Mimansa will be of great help in understanding the secrets of the Tridosha Theory. The researches of the Kaivalyadhāma are sure to solve some of the riddles of the modern medical science." *

THE TATVAJNĀNAMANDIRA, AMALNER.

January, 1925.

"It is a matter for congratulations that Shrimat Kuvalayānanda has founded an institution for a critical study of Yogic culture. His researches in the path of Yoga and his explanations of the Yogic problems from the view point of the present day sciences, are altogether a new activity in this country. Even if we ignore the spiritual aspect of Yoga, its physical culture side and therapeutics are, in themselves, of great importance. As the journal is being published in English, it will help not only all the Indian provinces but also the foreign countries to study the subject." *

ANNALS OF THE BHANDARKAR ORIENTAL RESEARCH INSTITUTE, POONA.

March, 1925.

"Without showing our scepticism as to whether the Western laboratory methods of research can be made to reveal spiritual wonders, we may congratulate the editor on his attempt to develop the objective character of the Indian Philosophy by subjecting the spiritual experiences of man to experimentation. Apparently the Director of the Kaivalyadhāma believes in the principle that whatever exists, exists in some

* These reviews are faithful English renderings of the original vernacular.

quantity and what exists in quantity can be measured. Statements of a purely speculative nature if corroborated by laboratory experiments will acquire scientific value and more light will be thrown on the nature of the Yogic psychosis which are at present regarded as quite mystical. Psychology in its relation to other sciences such as Physiology needs to be studied without merging the one into the other and the efforts of the Kaivalyadhāma will, therefore, be awaited with eagerness by all interested in such studies."

PROGRESS OF EDUCATION, POONA.

July, 1925.

"Tradition tells us that the Yogis of yore worked miracles; but the wonderful science has remained to us a sealed book partly because it is believed that a misdirected attempt to probe into its secrets leads to disastrous results and partly because of the scepticism of the twentieth century. The journal *Yoga-Mimansa* aspires to give the necessary directions to the needy and remove the scepticism by demonstrations in the language of modern sciences.... Being profusely illustrated the journal has an inviting appearance. The contents are beyond our ken and we would not risk comments on them. We wish the editor every success in his noble enterprise."

PRABUDDHA BHARATA, CALCUTTA.

October, 1925.

"This magazine is published to record the result of research done on a scientific basis in the realm of Yoga Philosophy. The experiences of a Yogic life have never been subjected to scientific experimentation, and for the first time an attempt has been made in that direction from the Ashrama founded by the Swami. In the volume before us are given various poses with copious illustrating pictures, which may cure many chronic diseases. This is properly the province of Hatha-Yoga, a science which has got a bad reputation as

encouraging only mystery and miracle-mongering. The author's scientific treatment of the subject will clear all prejudices from the public mind and enable people to test it for themselves. We wish success to this altogether a new enterprise."

NATUROPATH, NEW YORK CITY.

August, 1925.

"In appearance, language and style it reminds one of the staid old London scientific quarterlies; the photographs and X-Ray pictures with which it is abunduntly illustrated also create the impression at first that one is dealing with a product of modern Western civilization instead of an organ of Hindu culture.

"The comparatively high civilization of the ancient inhabitants of India is of course sufficiently important to us, Westerners, to have caused a not uncommon acquaintance with Yogic culture on the part of the educated classes of Western societies. And right here it is where you will at first be somewhat baffled, reading this debut number of the *Yoga Mimansa*, especially if you omit perusing the opening remarks on the inside of the covers, because you would expect to see something quite different from physical exercises and a study of their effects. The Editorial remarks, however, explain that although Yoga is mainly spiritual, it teaches excellent system of therapeutics and physical culture; and the latter, minor side of Yoga science, has been singled out for a thorough study, while the spiritual side connected with it will be taken up later.

"In the first issue two exercises have been chiefly dealt with; *Uddiyana*, for raising the diaphragm, and *Nauli*, by which water is raised into the colon without any external mechanical help, hitherto explained as due to anti-peristaltic action, but which the Ashrama has experimentally shown to be caused by a vacuum created in the colon.

"The entire scope of action planned for the Institute and its quarterly is not entirely clear, but we are evidently dealing with a publication well worthy of serious attention."

A PERSONAL APPRECIATION

PROF. R. D. RANADE,

Director, Academy of Philosophy & Religion, Nimbal.

August 10, 1925

"My opinion about the Yoga-Mimansa has been that it definitely supplies a felt need. The get-up of the journal leaves nothing to be desired. The art pictures are excellent and you are not sparing yourself any trouble in conducting that magazine. The physiological side of Yoga had to be tackled by somebody, and you have done it most ably. I am sure physiologists and men of medicine would have to take your researches and expositions into account. You are probably opening to their vision something entirely new. One feels constant wonder how you should have amassed so much insight into psycho-physiology during the last few years. I am sure also, that your work, as embodied in the Yoga-Mimansa will certainly influence the students of Experimental Psychology and Physiology in course of time. There is no journal of the kind you are editing in the whole of India, and I wish your endeavour every success."